



The Hybrid Water Power Project

BY Robert Volk

A Research and Development Project With Fully Detailed Instructional Manual to Help All Who So Desire, To Build Their Own Gas Saving Hydrogen Generator (HHO Gas) AND INSTALL a working System Into Their Vehicle.



- ... Instantly Turn Water into Fuel To Save GAS
- ... Add More POWER To Your Engine
- ... PURIFY the Exhaust to help the environment!
- ... MAKES No Changes to Your Current Engine/Gas System
- ... No Additives Needed In Gas Tank!
- ... Bolts On/Hooks Up To Your Intake In Just a Few Hours!

"AMAZE Your Friends and Family - Be the FIRST To Convert Your Car into a HYBRID Fuel Gas Saver for UNDER \$200!"

Uses LESS than A Gallon of Water per month
Saves 15 – 30 Gallons of Gas or MORE per month
Pays For Itself completely in The First Month Or Two!
Easy and Quick to Assemble!

"...Build it yourself from readily available parts that you can get from Home Depot, Lowe's, or your local home improvement center."

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LEGAL DISCLAIMER-

THIS BOOK IS PROVIDED FOR INFORMATION PURPOSES ONLY

We, as a people, can no longer WAIT for the politicians to make change. It's been over 30 years since the last fuel crisis, and what have they done? NOTHING. So don't hold your breath waiting for them to affect change, when both parties are heavily indebted to the Oil Company PACS (Political Action Committees) and others. Their inability to action, leaves us no other choice but to find solutions ourselves.

I've provided this research for you to use to help relieve you of enormously out of line Gas Prices that are crippling our economy. It is a very real solution to a very real problem that must be addressed.

If you choose to use it, please be aware that Using some of the devices or methods described in this book on a running vehicle may be illegal in your country. Check with your local authorities. I've been told unofficially that some methods may be illegal to use on public roads in the USA. I'm sharing it with you to use for off-road testing, as well as for experimentation outside the jurisdiction of the USA.

If it is illegal in your country, then you may have trouble getting a licensed mechanic to install it. He may refuse installation in your vehicle if there's a chance he could lose his license. Doing it yourself may be fine if you install it in your own personal vehicle. THIS IS NOT A LEGAL ADVICE.

If you are afraid or unsure, contact your local authorities who govern the area of hybrid conversions on existing or experimental vehicles.

You will notice also that converting car to HHO gas may cause it to Run cleaner than normal. Apparently this is bad to the emissions testing people in some states because they don't know how to handle such remarkable news. They will fail you because they assume you must have a hole in the exhaust or something. If this happens, you may need to turn off your system or temporarily disable it.

We must find a way to survive until our so called "Public Servants" Start serving the needs of the public and not the companies that Bribe them. Use the secrets in this book to help you, if you so choose But do so at your own risk. As we have no control over the quality of your craftsmanship or attention to detail, we assume no responsibility for any harm or damage that may occur to you, your friends, family, relatives, neighbors, or anyone else. We also assume no responsibility to any damage caused to your personal property, others property and/or public property as a result of experimenting with any or all of the ideas in this book.

HHO gas is a highly explosive gas and must be handled carefully and responsibly. Do not experiment with any thing in this book without the absolute and utmost care and precaution. If you are irresponsible and/or careless, or stupid, do not experiment with anything in this book.

Acknowledgements: I would like to thank my wonderful wife of 26 years for all her love, patience, and encouragement over these many years of hard work and long hours. Most women would never have put up with the sacrifice and trials inherent in allowing me to pursue the dreams written deeply in my heart, but then, you are not most women. Thank you Babe, your sacrifice will be richly rewarded. To my children who have put up with their very "unusual" father, I am truly a blessed man. To my son, whose faith and encouragement never fails to amaze me, and who, without his equally hard work and incredible marketing prowess, this book would never had made it into the hands of those that truly need it. To my friends who have believed in me for many years, through all my successes and failures – thank you. Also a special note to J. Patterson who spent countless hours "sweating the small stuff" in his CAD program putting together beautiful drawings for use in this manual and our kits – you're awesome man!

To all my fellow experimenters, inventors, dreamers, and visionaries – never give up on your dream, though it tarries. There is no substitute for persistence in the face of trials- If you really want it, you will find a way, no matter how long or hard the resistance. If you don't, you really didn't want it bad enough.

Special Thanks to the brave and brilliant thinkers - men and women of the past who refused to think within the constraints created by the uninspired box makers. Da Vinci, Tesla, Edison, and more recently Gray, Meyer, Pogue and many more- your works continue to inspire me and others as we work towards new breakthroughs in energy production.



Welcome To an EXCITING new world of Clean Energy from Water!

Congratulations on purchasing this cutting edge book on one of the most exciting ways to SAVE GAS since the invention of the hybrid! You will **Quickly** learn how to take ordinary items found at your local Home Depot, Lowes, Ace Hardware, or Local Home Improvement Store, and turn them into a powerful Water Fuel generator for your car. **Saving you MONEY on Gas**, cleaning up the sludge from inside your engine, and burning the exhaust gases **CLEANER** than your present engine does now, which is **GREAT for the Environment!**

The Simple device pictured on the right is an **"ON DEMAND" Hydrogen Generator (HHO GAS)** easily constructed of inexpensive and readily available plumbing and electrical parts.

The **"Power Cell"** easily hooks up to the battery of your car. The container is simply filled with distilled water (available at your local grocery store), a couple teaspoons of an electrolyte are added (to cause electricity to flow through the water) and using century old **proven technology**, the water is **INSTANTLY** transformed into its basic molecules of Hydrogen and Oxygen, called HHO gas.

I will show you step by step everything you need to know to put this amazing device together and install it. If you don't want to spend the time collecting everything, we [have some KITS and Parts available here.](#)



"ON DEMAND" Hydrogen and Oxygen Power Cell

The container above was put together in about 30 minutes.

The **"GUTS"** or Plate Stack (shown below) take a few hours to prepare. The Above assembly can be installed in 2 – 4 hours in your car, truck, van, or SUV. Once Installed, You WILL immediately SEE Results – Increased Horsepower, Smoother idling, INCREASED GAS MILEAGE, Cleaner Emissions.

SO In ONE WEEKEND, you could have this BUILT and INSTALLED and SAVING YOU MONEY

Read This manual, Follow the Instructions, You WILL see results or I will personally refund Your money back on this book*.

Read OUR UNCONDITIONAL Guarantee!

You have a FULL 90 days from the purchase of this book, to implement, build, test, and install this Hybrid Water Power Cell in your vehicle. You must follow all the instructions (especially the "PREPARATION" of the plate stack as outlined in detail) AND have a car, truck, SUV, or van that is properly tuned and maintained with no mechanical problems (bad engine, dragging brakes, bad O2 sensor, etc.). You must also use at least ONE of the recommended solutions for dealing with your O2 sensors with this system. If you do all as recommended, and you track and can verify your mileage before and after (Use our online calculator to determine % of mileage gains!).

If you do not see an increase in mileage, I will refund 100% of the price of this book!

A Quick INTRODUCTION:



I started inventing when I was 9 years old. I would always scoot the workbench into the middle of our garage and create a space for my prototypes (sorry dad!). I remember in particular working on a small jet type compressor/ turbine that could be used for jet packs because I wanted more than anything to fly like a bird (OK, so it was only out of balsa wood, but I was only nine!).

I have built many prototypes since then. I've patented, marketed, tested, and sold different products. But my passion has always been Energy related products, especially in the electrical and electromechanical realm.

Most of my work, design and research centers on it. I love anything to do with Energy production, storage, alternative methods and ecologically friendly solutions to our energy needs.

"I Truly believe this next decade will be an exciting time of innovation and break-through in these areas as political and financial pressures force our politicians and corporate leaders to allow this groundswell of change to occur. They will have no choice, adapt or be left behind."

People are screaming out for change...

It is this driving force, along with insanely out-of-control gas prices and do nothing politicians, which led me into this exciting area of Alternative Energy production. I discovered that many thousands of people around the world are experimenting with a form of Hydrogen (HHO gas - an EXTREMELY easy to make form of Hydrogen and Oxygen). **It's so easy**, it does make one wonder why the auto manufacturers have not come to include it in their cars, or why the mainstream doesn't know about it.

It burns the existing Gasoline faster and cleaner, drastically reducing polluting exhaust gases. It **causes your car to run a little cooler** because it's running more efficiently. It results in a slight **increase of power**. **It SAVES GAS!** All for under \$100 in readily **available parts** (I currently save more than that much in gas in my full size Van with a 5.7 liter engine – imagine what you could save with your car!)

Now, I have to admit, when I first starting researching this subject, I didn't expect much. If you Google HHO Gas or go on YouTube, you will find a plethora of videos and information. Some good-

lots of bad. You will find hundreds, even thousands of people all over the world building and testing variations of styles and designs to create as much gas as possible.

People are throwing together ill-conceived and poorly built generators and selling them for ridiculous amounts of money (I saw a "Mason Jar" design a guy was selling for \$600!). Most result in disappointment, and they give this exciting new area a bad reputation, especially the JUNK sold on EBay. Yikes! Most of them are poorly designed and built from others' plans, and I'd be willing to lay odds that the vendor has never installed one in his life, let alone try to help you with installation procedures or to save gas.

It's so much information overload. What works? What doesn't? Is this a scam? Can it **REALLY** save me money? Is it hard to understand? DO I have to be a mechanic to put one of these together? I answer all these for you.

It was my goal to research and TEST these devices, to see if the stuff out there was all hype, or if it really could work. I set myself to the task and began building and testing and researching. I spent well over 4 months digging deep into this area and many thousands of dollars (so you don't have to!) buying parts, building, throwing away and starting over.

After months of testing, I narrowed down the true Hydrogen producers out there, as well as the "System" needed to make them actually pay-off in measurable gas savings. There are 2 really good designs that I prefer, one is a variation of the "Smack Booster", and one is a marvelous design by a guy called "ZeroFossilFuel" on YouTube. The latter, while more elegant and efficient, is also more complex and expensive to build than the former (Smack Booster). I use the booster (we're going to refer to it as a Power Cell from here on) in my vehicle and others, because it's quick and easy, and a reliable workhorse. Since that was the goal, that is where our focus will be.

I urge you to check out **zerofossilfuel** on YouTube during the process, you will get an education like no other in this field of HHO gas. **Make a donation to his site** – as the information he shares is given freely, so he could use support. Once you build the Power Cell and start saving money on gas, then you can experiment with more complicated designs, buy your own stainless steel plates, PWM's, EFIE's and the like.

Much of the information about the booster (Power Cell) is now popping up in various locations around the world, but I have changed a few things on it that make a difference. I also go into very detailed Assembly instructions as well Installation and hope to answer all your questions as we go forward.

My desire is that you will see how incredibly easy it is to supplement your gas with this awesome fuel called HHO that lies dormant within the very water that we drink! Have fun! Read the cautions and be smart, and you will quickly amaze your friends and family with this incredible power source.

MOST Designs Are JUNK!

My suspicions were true in that MOST of the junk out there is just that – junk. Miserable excuses of electrolyzers that overheat and under perform. They are also not developed into systems that actually WORK, like what I've outlined for you.

Don't be deceived. There will be a lot of people trying to sell you their version of these HHO generators, when all they've done is read some info on the internet, and slapped one together out

of spare parts. Most have never taken it from the "Making Hydrogen" stage to installing AND KEEPING it working in their car (One trip to the gas station and back does not prove a functioning unit).

They make bubbles on their living room table, **but bubbles can't save you money on your gas.**

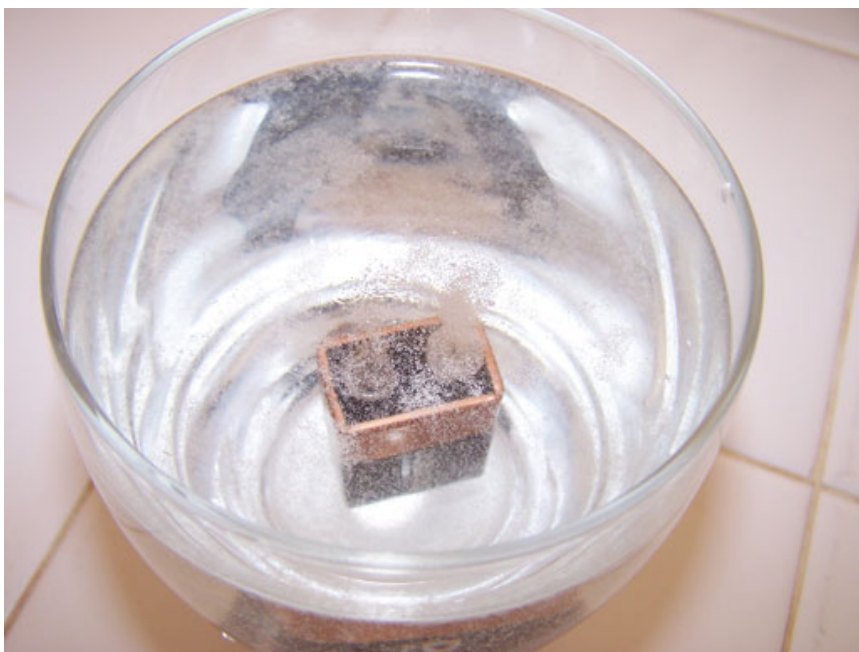
The CHEAP 2 MINUTE 2 DOLLAR PROOF...

If you want bubbles, here's a **CHEAP 2 MINUTE PROOF- an experiment** to prove how simple it is to make this HHO GAS...

Get a glass of water and put a teaspoon or two of baking soda (like Arm and Hammer).

Stir it up until it dissolves, then drop a NEW 9 volt battery into it. Within seconds of putting the battery in, bubbles will be already forming, like the example at the right.

The Hydrogen is coming off the right terminal (which is the negative side, and the Oxygen is coming off the smaller terminal on the left (the positive side).



Here it is after just 10 seconds.

See the cloud of bubbles gathering at the top of the water? THAT is HHO gas – the mixture of Hydrogen and Oxygen, the basic constituents of water.

In an electrolyzer, that foaming cloud you see forming fills the entire liquid solution which is similar to what you made here – water and an electrolyte.

Below is a side view after 10 seconds. Does it look like there are more bubbles coming off the right terminal than the left? There are!

H₂O (water) is made up of the H₂ (which is 2 molecules of Hydrogen) and the O which is 1 molecule of Oxygen). You see twice as much gas (Hydrogen) is being made on the right terminal because that's the negative side of the battery, where Hydrogen naturally attracts to. Less oxygen is being made because there's less of it in the water! That works for us, because Hydrogen is what gives us extra power and helps the gasoline burn better, oxygen helps to "oxidize" the fuel to burn (like blowing on a fire to get it going).

CONGRATULATIONS! You just built a 2 Minute Hydrogen Generator!

Now, obviously, these are miniscule amounts being made, certainly not enough to power a car, but you get my point.



Actual production in an efficient "Electrolyzer" (which is what you just built in less than 2 minutes!) is many hundreds of times greater than what you see here. The bubbles of HHO gas completely fill the water in seconds, and the gas is VERY visible coming off the top, and very explosive, which is what we want.

Don't worry about blowing up your home with this little amount. The second you pull the battery out, it stops making HHO gas and the gas dissipates VERY rapidly (Hydrogen holds the world record for fastest igniting and fastest dissipating gas!) DON'T try to light the bubbles on the surface of the water, you don't want to explode your glass...

The conclusion: IT WORKS!

So, now you can see how easy it is to make bubbles. I have just saved you a ton of money, because people are spending their hard earned dollars just to see if it works or not – big deal. As I said, bubbles are cool, but they DON'T save you gas.

Now that you **KNOW** it works, I will show you EVERY STEP, every detail to build the RIGHT design AND HOW to install it and start SAVING GAS right away.

Follow along with me now as I teach you the basics or if you want, just jump to the "LET'S BUILD IT" part of this manual, the choice is yours! These designs are not patentable (though I have discovered a few breakthroughs in the process that are being researched as you read this). They are public domain, **meaning anyone can build them, including you.** The design I go into detail with you is out there, but unless you knew where to dig, you'd never find this treasure.

WHAT You Are Going To Learn:

This book is setup to take you through a natural progression of steps.

I give you a **detailed summary of everything in PART ONE** of this book, and in Greater Detail in the **LET'S BUILD-IT and LET'S INSTALL-IT sections (PART TWO and PART THREE)**.

If you just want to dive in to building it, go ahead and **skip forward to PART TWO**
If you want to save time and just buy a kit, or parts of a kit, [we sell them here](#).

But briefly, the areas I cover are:

1. The HHO Generator- design, parts, building it, important safety issues that you don't want to skip!
2. Dealing With The Car's Computer and the O2 Sensors
3. Add a Simple Filter to increase your mileage even more
4. Other Options to get even greater mileage results!
5. Installation, Testing, Maintenance

I have taken the time to document with text, photos and videos my foray into this fun new world of Hydrogen as an alternative fuel. I hope to inspire you to not only read this book, but to go out get the parts and build one or two or more, and use them. I want to hear reports that others are saving as much or more than I am.

I will also be constantly updating the book with new breakthroughs, new suggestions and ideas, and any other gas saving products that I come across.

If you find any beyond the scope I cover here, please feel free to **email me** and (if it has merit) I may buy it and test it out and report on it for you so you can find out if it's worth your money or not.

I buy, build, and install new products and ideas almost every week. I only make one change at a time so I can measure the results and give accurate reports to our members, if it doesn't work, I have no problem telling you.

I want this to be a GREAT experience for you, so you can spread the word and get others excited about it.

Together we can make a change because we can't afford to wait 20 years for the gutless politicians and greedy oil companies to do something about it. But this is something we can do RIGHT NOW. Don't throw away anymore hard earned dollars than you have to – please.

- Build it.
- Put it in your car.
- Start saving gas.
- Tell others about your cool Hybrid Water Power Car!

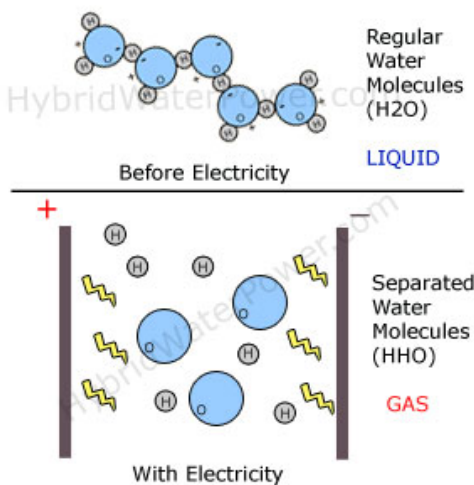
The RIGHT Answer – For TODAY!



There is a HUGE movement going on around the world right now, even **as you read this!** THOUSANDS every month are building and testing different variations of these HHO generators and installing them in their cars (mine took less than 2 hours to put in after I built it).

People EVERYWHERE, with all makes and models of cars, are **SAVING GAS** by using various forms of these simple, Easy-To-Make, electrolyzers (this is a Worldwide Phenomenon due to insanely rising gas costs, YouTube, and open collaboration and testing via Bloggers, Websites, and the Internet!).

How Does It Work?



Very simply, when electricity flows between two metal plates (or wires) that are immersed in water, the water is broken down into its basic molecules- Hydrogen and Oxygen through a process called electrolysis.

The Hydrogen and Oxygen separate and become a gas made up of Hydrogen, hydrogen, and Oxygen – Hence HHO gas. When HHO gas ignites – it simply reverts BACK into water!

How cool is that?!

By using a **Hybrid Water Power Cell** such as the one I'm going to teach you about, you can use the *extra energy available* from your cars alternator (which constantly charges the battery) to "Electrolyze" or separate this HHO Gas from the distilled water inside (See the **CHEAP 2 MINUTE PROOF in the introduction**)

This gas, produced ONLY when your car is running (no dangerous storage is needed), is then fed into the air intake of your engine (typically where the air filter is installed), and mixed with the Gasoline and Air that are normally sucked in to make your engine run.

- You Do NOT add anything to your gasoline tank
- You Do NOT modify your cars ability to run without the Power Cell
- You Do NOT have to change the engine or engine parts
- You CAN remove the Electrolyzer (Power Cell) at any time for maintenance or to put it into a different car
- You CAN turn it off and still run your car as before and get the same horrible mileage if you want

There are **no BAD effects** from doing this (except maybe angering the Oil Companies, and why would anyone want to offend them?!;)

There are a lot of **GOOD** reasons to do it – some of them being:

- HHO Gas Burns Faster actually cooling your engine temperature
- HHO Gas Burns **CLEANER**, practically eliminating pollutants
- HHO Gas Increases your engine Horsepower
- HHO Gas Reduces Carbon Dioxide, Monoxide, and Particulates
- HHO Gas causes gasoline to burn better – You Use Less of it
- HHO Gas **SAVES YOU MONEY** on gas!
- HHO Gas actually **CLEANS** the inside of your engine
- HHO Gas works with any engine – Gas, Diesel, or Bio Fuel

Does It **USE** a Lot Of Water?

NO! This is one of the first questions people ask when they see the “**Power Cell**” in vehicles that I’ve installed them into. It is what is so absolutely amazing about the creation of HHO Gas – how much of it is present or “stored” in our everyday water!

HHO Gas Is **NOT** Steam injection (higher current models do generate heat which can cause some of the water to turn to steam, but the amount of water used even with high current systems is still only about a liter of water a week!

HHO Gas is **NOT** water injection either – more on that in a minute...

Is it Dangerous? Do I have To Worry That I’m driving around With a Bomb In My Car?

NO! You are **not** driving around with a bomb when you have a **Water Hybrid Power Cell** in your car. The “Fuel” is stored in the water, and isn’t turned into HHO Gas until you start the car.

Unlike popular Hydrogen technology being worked on today, HHO gas Power Cells only generate a small amount of gas at a time, which is immediately drawn into the engine and mixed with air through the air filter.

Is HHO gas explosive? Of course, just like gasoline, it combusts and causes work to happen when it does. It would be useless if it didn’t. But if you make it as outlined in this book it becomes as safe as working with gasoline – probably safer because you’re not storing 20 gallons of it under the trunk.

There are a couple of **KEY safety features designed into the Power Cell** to help prevent any dangers if the HHO gas were to explode “Inside” the electrolyzer. These improvements have been



The FUEL is Stored IN the WATER- ready for use!

designed by other users and posted on various blogs and user groups, and I have **researched AND TESTED** them to make sure they worked before putting them in this book.

I have even **exploded the Gas inside** the electrolyzer/Power Cell, to test the pressure relief valve (Which worked perfectly)! The only gas that exploded was the minute amount in the 2" of air space at the top. The valve popped, the gas was gone and everyone was perfectly safe. The valve was reset, and immediately, the electrolyzer was up and running again making Gas-Saving HHO!

I will teach you HOW to add this AND other features to your "Power Cell" to make your experience SAFE!

PURE HYDROGEN is more dangerous than HHO GAS!



It's the pure Hydrogen cars that drive around with potential bombs in their trunks – tanks filled with literally Thousands of pounds of pressurized Hydrogen Gas or Liquid Hydrogen. There's also actually LESS Energy, pound for pound, in that system, than in an "ON DEMAND" HHO system.



The picture at the left shows a compressed gas Hydrogen Tank in the BMW 7 Hydrogen car (only one available, but a second one is being made – if you have a spare \$500,000)

Would you want that tank sitting next to or behind your kids' car seat?

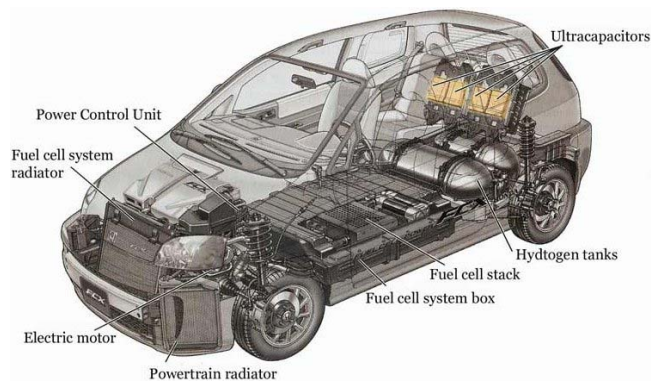
HUGE AMOUNTS of HHO Gas Lay HIDDEN In A Gallon Of Water!

Water is so dense, that when creating HHO gas, the electrolyzer just "sips" the water compared to the amount of energy you get out of it! It's like Nature's huge storage tank of Energy!

Unlike conventional Hydrogen usage (where Hydrogen is purified and stored for future use, HHO gas can **INSTANTLY** be freed from it's natural storage Tank (WATER!), and **INSTANTLY be put to use ON DEMAND!**

The Hydrogen powered cars being touted as "Breakthrough" technology (still twenty years away from availability on a large scale) CAN'T generate their own Hydrogen and need to be filled at a processing plant.

"When was the last time you saw a Hydrogen Filling Station in your everyday driving route?"



Look AT Where High Pressure Tanks ARE Stored!

In fact, Hydrogen that you see being used in cars like the new BMW, Honda, and others is actually separated from Oxygen, compressed and stored in a giant tank under THOUSANDS of Pounds of Pressure. Then it needs to be transferred into another 10,000 P.S.I. (pounds per square inch) carbon fiber wrapped, bullet proof TANK - in the car.

Look at the above "Pure Hydrogen" car being made in India. The high pressure storage tanks are stored right under the back seats! Shades of Hindenburg....

This form of Hydrogen has only 80% of the energy of Gasoline, so it can go as far in between fill ups as a tank of regular gas. HHO gas on the other hand, **Has 300% MORE energy** (pound for pound) **than Gasoline!**



SO, HHO Gas 300% More energy Pound for Pound, than Gasoline and almost 4 times the energy in "Pure Hydrogen".

- HHO Gas has **3 TIMES MORE energy** than same weight of Gasoline!
- HHO Gas has **More energy than just Pure Hydrogen!**
- Water is SO DENSE, one Liter of Water will produce Over **1,800 Liters of HHO Gas!**

1,800 Liters Of HHO Gas Out of Every Liter of Water!

Because of the density of water, there is not a lot consumed in the process of making and using it in a **"Power Cell"** (electrolyzer).

Some people find that a gallon of water for their "Power Cell" will last 3 -4 months. I find in my van with a 5.7 liter V-8 engine, that I use about a liter of water a week to save 30 gallons of gasoline or more per month! Now, I run higher current through mine than others do, so some of that is probably turning to steam because of the heat. But I have such good results, I'm not complaining!

So One Gallon of Water = 30 Gallons of Gasoline in savings!

Pretty good trade wouldn't you say?

That's been my findings with this particular style of electrolyzer. Others may get better results with less water usage. But I'm completely willing to use one liter a week of WATER to save 30 Gallons of Gas – Aren't You?

By the way, the 30 gallons of gas are based on my normal consumption, normal driving habits; my loaded van, driven throughout the congested Bay Area, in normal rush hour traffic, WITH air conditioning and radio (**no** "Hypermiling" **tricks** to stretch mileage).

I typically use \$400 - \$600 in gas per month (between 25 – 40 gallons of gas a week). Saving 34% on my Gasoline bill by using HHO Gas results in **OVER 30 gallons of Gasoline saved every month!**



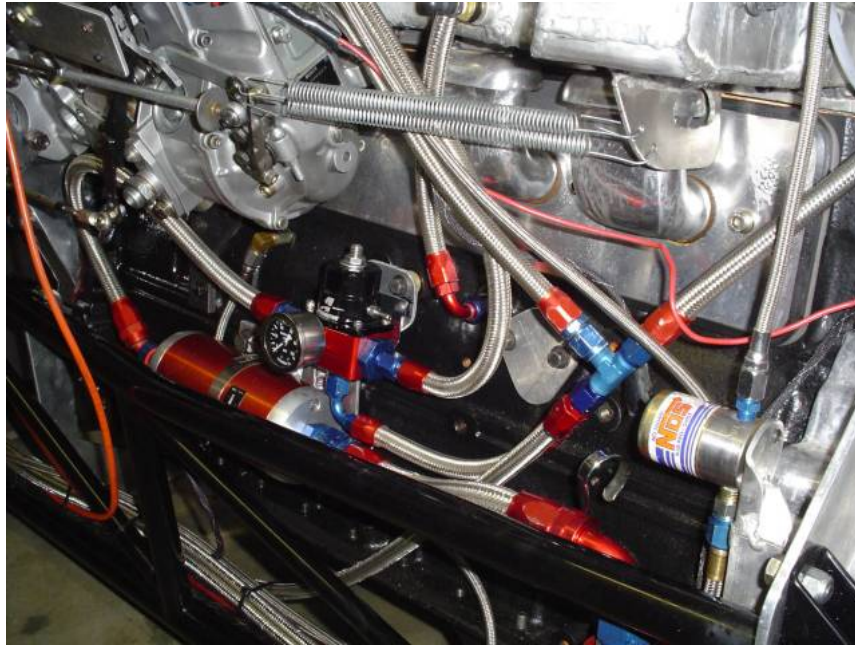
If you have a small car –you can do **EVEN BETTER**, generally **50% or more IN SAVINGS** On Your GAS!

HHO GAS Is NOT Water Injection!

By the way, in case you are wondering, this is not like the old "Water Injection" that was popularized in the late 70's. That method involved spraying a mist of water directly into the intake

manifold of the engine. It is still widely used today in racing to help lower interior temperatures of the high compression engines.

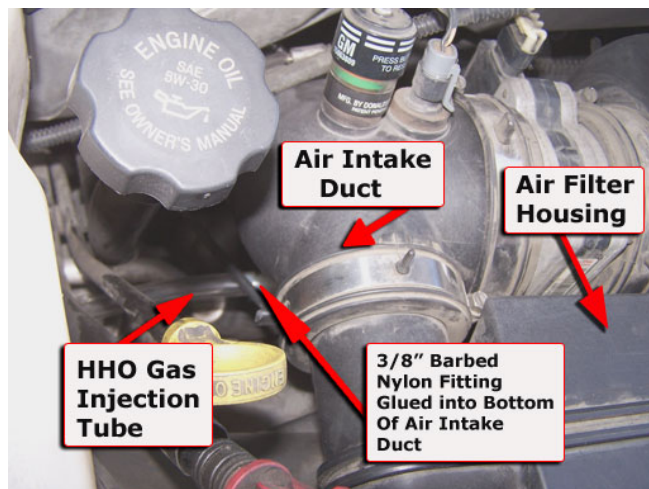
That is NOT the same thing as HHO Gas injection! Water injection DOES use a lot of water and many times people confuse the two. Here's a photo of a Water injection system installed on a racing engine.



This is A Typical Water Injection System

You can see **how complicated** this can become. It usually requires installation by a trained mechanic because the engine has to be torn apart for fittings to be drilled and inserted. Very expensive way to go and not what we are learning of here.

Not many people would be putting those in their cars if that were the only choice....



Now let's look at a **typical HHO Gas** Hook up and **compare it's simplicity** to the more complicated water injection method...

A Typical HHO GAS System Hook up

As you can see above, **only one tube is needed for HHO Gas** to be introduced into your cars engine.

Some people will occasionally use a Dual Hose Set up, where One Tube goes into the air filter housing area and one tube goes into the intake manifold vacuum, but we will discuss that option later in our "Installation" chapter.

This particular installation above is in a 2500 Chevy Express ¾ ton Cargo Van with a BIG 5.7 Liter engine. **It went from 10 MPG to 14 MPG with HHO (That's a 40% IMPROVEMENT!)** and we're NOT done yet!

A LOT simpler than a Water Injection system – wouldn't you say? One tube goes directly from the Power Cell (Indicated as the **HHO Gas Injection Tube**) into the bottom of the Air Intake Duct. That's it! Pronto! Finished!

We'll talk more of the installation and some other important details a little later on...

What Kind of Car Can HHO GAS Be Used On?

- Old Cars
- New Cars
- Hybrid Cars
- Carbureted Cars
- Fuel Injected Cars
- DIESEL Cars
- Gas Cars
- Flex Fuel Cars
- Bio Fuel Cars
- Hot Rods
- Trucks
- Vans
- Motorcycles
- Power Supply Generators
- Any Combustion Engine



EVERYONE can **SAVE GAS** by quickly making one of these simple **"Power Cells"**, and hooking them up to their cars.

Everyone? Well, everyone except the "experts" who insist (in their old school ignorance) and **say it can't be done.**

I've read Countless essays and lengthy math formulas of all these so-called "experts" who say you can't get Free Energy (you're not), it takes more energy to make than what you get from it (Wrong), best you can expect is ½% improvement (WRONG again.)

Are they just voluntarily ignorant of all the successes of people doing it? Are they paid shills of the greedy oil companies? Are they just stupidly smart? Who cares! If they had built one **CORRECTLY**, they would see they **DO WORK!**

DON'T Listen to the Naysayer! They gripe and complain and will give you ALL the reasons why it couldn't possibly work, and then never even try to build one. They know all the math, all the formulas and reasons why it **shouldn't** work. They refuse to allow reality affect their preconceived point of view.

Please, listen to me; this thing costs under \$100 to build. You can put it together in a weekend, or evenings while watching TV. IF you build it, you CAN start **SAVING GAS IMMEDIATELY!**

I Know, because I've built them, tested them, and am Using them everyday!

Is This FREE ENERGY?

I am **NOT** trying to say this is some Free Energy device as others all over the internet are boasting. I don't believe it is. It's simply an efficient "Brute Force" electrolyzer that uses previously wasted electrical energy (Your alternator is made to produce FAR more current than your car needs to run).

You USE this wasted electricity to make a gas (HHO) that causes the "incomplete and inefficient combustion process" in your engine to occur **BETTER, More efficiently**, resulting in more **useable power not** wasted as heat!

Depending on what you read, present day engines are only 20% - 30% efficient, most of the energy being wasted as heat. By introducing HYDROGEN and OXYGEN into the fuel/air mixture going into your engine, you cause the gas to burn FASTER, which actually cools the engine because you're not creating as much heat, and you save gas. It's as simple as that!

NO, it does **NOT** put a huge drain on your engine to make the alternator work harder as some would argue (especially if you use a PWM to pulse the power to your electrolyzer). And **No**, it does **NOT** take more energy from gasoline than what you get in HHO gas benefits.

YES! People are saving GAS. **YES** you can feel a difference in your car's engine and power! And **Yes**, you are Cleaning Up the environment by burning previously unburned or incompletely burned gas (which is why your car needs one or two catalytic converters).

YES! It CAN save you gas money in exchange for water. In my case, **1-1/2 liters of water a week to save 30+ gallons of gas a month!**

IF You BUILD IT, They Will Come... (To believe)

If you build it, and make it like I show you in the pages that follow, you will save gas from the first day. I guarantee it. If you do everything I show you, and your car is in decent running condition, **You WILL save gas or I will gladly refund the price of this book!**

That's how confident I am this will work for you. I know, because I've built and tested a lot of different designs. And this is one of the best – and it works well enough that I use it – every day.

(By the way...Don't expect to get huge results if you haven't changed the oil in 20,000 miles or done a tune up in 5 years. If you maintain your car you will get better results – "Them's the rules, kiddo")

REMEMBER: I have saved over \$120 a month in gas using only a little more than a liter of water a week to save over 30 gallons of gas! Others have gotten even better. Many have gotten worse because they DON'T know what they are doing! Follow the instructions I've outlined for you – you will see an increase!

How Simple Is It?



It's as simple as it gets. Seriously. We are just going to take the same principles I showed you in **the 2 MINUTE EXPERIMENT** above, and build a bigger, better method that uses your cars battery instead of the little 9-volt.

The Auto Manufacturers and the Big Oil Corporations (that are laughing behind our backs), want you to **"THINK"** it's rocket science. They want you to **"Think"** there is no other solution but theirs. They want you to **"THINK"** it will take ANOTHER 20 years to get this technology ready.

How much more time do they need?

JUST Give Us More Time!

A Local TV Station interview just last week as I was writing this section, was touting the marvels of running your car on Hydrogen (not HHO gas, but the 99.9% Pure Hydrogen).

"Why, it's so wonderful!" They proclaimed. "It burns clean, it is made from water!", etc. etc. blah blah blah, ad nauseum. In fact, this particular interview was at a local Lab in California.

Granted they did have a beautiful "Hybrid Fuel" car with a gigantic high pressure tank in the back that took up all the extra space (not too practical); Lots of high pressure hydraulic lines and tubes running all over the place.



Inspectors Looking At the Labs' Hydrogen Car

Be READY in 20 YEARS!!!?

Yep. That's what those "experts" at Lawrence Livermore were saying about Hydrogen technology. Ready in 20 years!

20 Years? Are you Kidding me? Does it **LOOK** like we can wait another 20 years with these gas prices? Ummm, I don't think so...

This is by no way a slam against the Lab. It's a fantastic place and certainly a world leader in technology. They just continue to look at this problem like all the other labs, corporate leaders, and manufacturers do - in an old fashioned, out-dated, crusty way, that's all.

You can't really blame them – they survive on Government grants for specific projects that are safe investments. They're not exactly set up for revolutionary thinking....

THIS Technology (HHO GAS) Is READY NOW!

And it's not complicated. And you **DON'T have to wait 20 years**. Is it going to turn your 8 Miles per gallon gas guzzler into a 100 MPG Hybrid? Of course not.



Will the truck on the left be turned into a fuel saving economizer with an HHO Power Cell?

Hahahahaha! No way, Jose'. (OK, I admit- I just wanted to put that in here because it was an awesome picture!)

But it can and does regularly take 9 and 10 MPG cars and turn them into 14 and 15 MPG, and even more with the right system! That's as much as **50% increase or MORE in your Gas**

Mileage! Better than a hybrid, Better for the environment, Better for your wallet!

Smaller cars often fair better than the larger ones. For instance, if you normally go around **350 miles per tank of gas**, a 50% improvement for you will mean you **get 500 miles on the same tank! A 100% improvement would get you 700 miles per tank!** Is that enough motivation to get you building?

That's huge – especially if you have to drive a vehicle to make a living; it can CUT your gas bill dramatically!

But, it can't do anything if you don't build it.

So I urge you - Take some time to gather the parts (**Or [buy a kit from us](#) if you don't want to spend a couple days hunting for everything**), and put this thing together. You will be amazed and wonder why this has not been put on every car coming out of Detroit!



The Water Hybrid Power System

All Right; let's get an overview of the basic system and how to make this thing work for you. I will give you a brief summary here in **PART ONE** first, and then we will move on to the details of the build.

If you want to just get going on the Power Cell, Feel free to jump ahead to the **"LET'S BUILD IT"** section in **PART TWO** – There are no tests that will be given or grades handed out...

I do recommend at least revisiting this next section, because it deals with some important aspects of the entire system so you get the absolute best results possible.

Let me reiterate again that these designs are in the public domain. They are not patentable or the patents have expired long ago, so they are perfectly fine to build and install. The main credit goes to Dustin, the designer of the Smack Booster design, who puts together a neat system for others to use.

I've modified a few things on mine to get even better production.

If you don't want to waste time gathering all the parts [we have them in a box as a kit here](#)

And now an important word from our lawyer...

WARNING!

Though every precaution has been made to make this a safe and fun adventure for you, you must realize that you are working with a combustible Gas!

As with all combustibles (including HHO Gas, Gasoline, Hydrogen, etc.), Precautions should be made to insure your safety.

If you follow the instructions laid out for you, your Power Cell will operate safely, and once installed will start saving you Gas Money Right Away!

We Don't want to scare you away from building these because they Work! Just **Don't be stupid – if you are stupid, DON'T Build an HHO Generator!** Get someone else, who is **NOT STUPID** to build it for you.

Please Review These **SAFETY WARNINGS** Before Building and Testing. As we have no control over how you build your Power Cell, we assume no liability against any damages that can occur, accidentally or otherwise:

Do NOT neglect to install a Safety Valve on the electrolyzer as outlined in the instructions.

Do NOT use the Electrolyzer/ Power Cell in or out of your vehicle without using a bubbler to protect against flashbacks. No matter what other designs you see, **USE a bubbler!**

Do NOT light the bubbles coming off the top of the bubbler or electrolyzer! You will see people doing this on YouTube a lot. If you search HHO explosions you will also see people's Electrolyzer exploding because they think it's safe to light the bubbles. If the bubbles are big enough, the flame will jump from bubble to bubble, down through the bubbler to the outlet tube of your Power Cell. If it gets there, you WILL have an explosion. Play it safe – make a Bottle Rocket Launcher if you want to play, but DON'T light the bubbles in a bubbler or electrolyzer.

Once installed, keep an eye on water level – **DON'T let it go dry** or you could ruin the plate stack. Get in the habit of checking often until you see what amount of water you consume.

Do NOT operate your Power Cell in a closed environment (like a garage or room). These things create a good deal of HHO Gas, if you are operating them inside your house, garage, or workshop, you are introducing this explosive gas into the air around you. If equipment or battery sparks – you can ignite this gas and cause damage to yourself or loved ones.

Do NOT, I repeat, **Do NOT** turn your Power Cell on without having a Pressure Relief valve installed first. It is CHEAP Insurance and will keep your electrolyzer from exploding-

Above all, BE SMART and you will reap the benefits. Don't be stupid.

OK. Now that we have that out of the way, let's get started...

A Quick Word About Public Domain...

As stated in the introduction of this book; the designs we are about to go into great detail about are in various places of discussion and chat groups on the internet. These are posted into the Public Domain as well as hundreds of other designs from everybody and his uncle.

My goal in researching this incredibly important topic, was to sort through the myriad of BS (anyone with a camera can post anything on the internet) and **BUILD and TEST the designs both on the bench AND in VEHICLES!** Then test and test again. SO I have spent many months reading and researching every design, angle, information I could find, then spent thousands of dollars and many months building, testing and installing, so YOU wouldn't have to.

I spent the money and TIME so you wouldn't have to...

The following design is among the BEST I have tested for HHO Gas production, durability, and consistency. It is not my design (as I have previously stated) and has been around in public domain for awhile, though I have actually developed several breakthroughs that eliminate some design issues inherent in it and other home made electrolyzers. Currently patents are being filed on these improvements, after which I may choose to share them with the readers of this book.

In the mean time, I have even had drawn up new CAD Drawings for the entire assembly (Special Thanks to John Patterson!) to make it as clear as possible what to do and HOW to do it.

And Now...The Basics

In all successful Power Cell Systems, there are **Key Components** that MUST be addressed for maximum results. I have listed them in order of importance:

Directly related to the electrolyzer or **Power Cell itself are these key areas:**

1. The Electrolyzer or Power Cell Design and function
2. The TYPE of Power Supply Used
3. The Type of Water used
4. The TYPE of Electrolyte Used
5. The Bubbler or flashback Protector

Along with the Power Cell there are additional enhancements that you can do that greatly increase your mileage. **Some are necessary**, others are optional, but we will explore these in detail – you can decide what you want to do for yourself.

The Power Cell **Enhancements:**

1. **The O2 Sensor (absolutely necessary, especially in cars newer than 1995)!**
2. MAP Sensor enhancer (optional- if your car doesn't have a MAF sensor))
3. MAF Sensor enhancer (optional)
4. PCV System Filter/Condenser – (optional)
5. Fuel System Pre-heater (optional)

In The Final Part of our guide we will explore the all important **INSTALLATION techniques** and recommendations such as:

1. Securing the Power Cell – where to put it and how to make sure it stays there!
2. Where to put the Bubbler
3. How and where to Hook Up the HHO Gas Input Tube to your engine
4. How to hook up the wiring
5. How to test and measure the output and performance of your Power Cell System

Let's look at the all important Electrolyzer first. It's the **powerhouse**, where all the work happens, **so its design is critical to your success...**

The Guts and the Glory!

The TYPES of Power Used

In the past, all electrolyzers ran basically the same – series of plates, (usually Stainless Steel because of corrosion resistance), immersed in an electrolytic solution, hooked up to a large power source of Direct Current (DC) electricity.

When power was applied, the current ran through the plates and across the water/electrolyte solution, causing the water to break down into Hydrogen and Oxygen.

A general rule of thumb was (and is) about 2 volts needed in between plates (or cells), and the more current = better electrolysis. This is called a "Brute Force" electrolyzer and is what we will build in this manual. It is simple, and consistent. It is also cheap and easy to put together as you will see below.

There has been a lot of experimentation for the last 30 years or so in the realm of pulsing power and high frequency power applied to special designs. The pulsing power uses a specially designed circuit board that chops the current rapidly to prevent the Power Cell from overheating, which can be a problem with the Brute Force style, if you don't watch your electrolyte level.



These pulsed boards are called PWM's or Pulse Width Modulators and are quickly becoming the norm with Power Cell builders around the world. They are commonly made in 10 Amp, 20 Amp, and 30 Amp modules with as much as 80 and 100 amp models (and higher) available for special circumstances, and special wallets! [We found a great deal on them and have a few left here.](#) (Scroll down to the bottom to see the three boards we now stock)

The PWM's are popular because they can be used to power Brute

Force electrolyzers like ours without any modification. They are supposed to produce the same amount of HHO gas, without the heating issues, but longevity has yet to be tested long term as they are still a relatively new product.

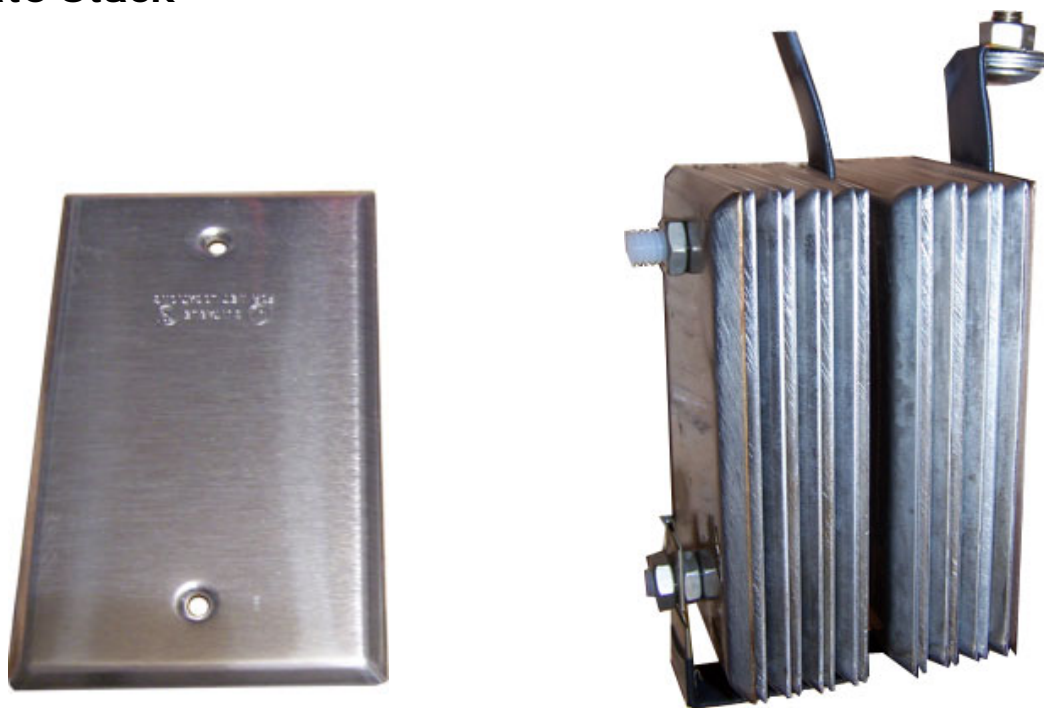
We will be doing further testing on these with our units and will report back to you our findings.

The other type of pulsed power is usually much higher frequency AC power that is rectified to DC. It is generally introduced into more specialized designs that try to take advantage of resonance within the plate stack. This is Far More ADVANCED stuff, best left to electronics experts and seasoned HHO experimenters.

For now, I recommend learning to ride a bike before taking on a jet plane....

So let's begin by examining the internal plate stack assembly where all the action takes place inside the container.

The Plate Stack



16 Stainless Steel Electrical Cover Plates ... Are bolted together to change Water into HHO Gas

The heart of the device, (the "Guts" of the Power Cell) is shown above. It was designed initially by Dustin (in His Smack Booster design) and is genius in its simplicity.

The plates are specially prepared (Make Sure to DO THIS as outlined for maximum effectiveness) and then assembled as shown. More details and explanations are in the "LET'S BUILD IT" section. If you are interested in [a kit with all these parts](#) for the plate stack, we have them for you here. Just look for the "Big Box of Parts" that has everything you need to both BUILD and INSTALL this unit in your vehicle. Every bolt, nut, connector, relay, etc. is there to save you the time of hunting everything down...

The HHO Gas is created in between the plates through electrolysis. This is just like the 9 volt battery in our **CHEAP 2 MINUTE PROOF experiment** in the first chapter, except these plates are

hooked up to your 12 volt car battery and use the charging ability of your alternator to make a LOT more gas!

The Hydrogen and Oxygen Gas (HHO Gas) is ONLY made when you start the car. The second you turn the car off, it stops making HHO. Whatever little remaining gas is in the container gets sucked into the intake system where it quickly dissipates.

Nothing is stored inside the Power Cell when system is shut off – making it far safer than expensive “Hydrogen Only” type cars.

- **No Containers are needed to store Hydrogen.**
- **No compressing of gases.**
- **No Storage of Dangerous pressurized Gas**
- **No need to find a Hydrogen filling station.**
- **Just Fill with distilled water - checked when you fill up with gas (or make an automatic filler unit – I’ll show you how)**

This particular assembly of plates was chosen for several reasons:

1. The 304 Stainless Steel Plates are widely available at home improvement centers.
2. The holes are pre-aligned and pre-drilled, needing only to be enlarged. This gives a great alignment and consistency to a hand-assembled electrolyzer – making it function extremely well.
3. This configuration was designed to fit perfectly inside a 4" ABS or PVC Pipe, making the container readily and widely available for all.

A note about this unique design: There are a myriad of ways to assemble an electrolyzer that makes HHO gas, just do a You Tube search or Google it and you will be inundated with every design imaginable.

Remember, even a battery dropped in water will make HHO gas (at least for a short time)

However, it is Critical to use **Stainless Steel**, not aluminum, not galvanized, not carbon steel, not copper, silver, etc or it WILL corrode in the electrolyte leaving you with a mucky brown slurry of a mess.

Unless you live in a large metropolis, stainless steel is **NOT** readily available at your local home improvement center **EXCEPT** as these blank cover plates.

Which is Why I Recommend THIS Particular Design.

IT WORKS. Build it, use it, save money because of it. Then with the money you save, feel free to experiment with other designs.

In the meantime **you will be driving a Hybrid Water Power Car** and be the envy of your friends and family!

Be sure to check out the **FREE** additional books I've included with this manual. One discusses all the different experimental designs that are currently being worked on, and which show the most promise! I discuss the advantages and disadvantages of each one and what breakthroughs to expect in the coming years!

The Water

The areas of water, electrolyte, and Flashback Protector/Bubbler will be discussed in greater detail as we get into the construction aspect.

But briefly, You **ALWAYS** use distilled water because of impurities (even in rain water) that can muck up your Power Cell Plate Stack, causing you to have to rebuild – yuck!

If you search You Tube, you will see how many people ignore this by the thick brown mucky water after a very short time of use. This muck cuts way down on the efficiency, and they don't understand why their project isn't working.... DUH!



The Electrolyte

Water, of any kind (except saltwater), does not easily conduct electricity, so it must have a small amount of electrolyte added which makes it conductive. If you were to drop a nine volt battery in a glass of water with no electrolyte, it would just sit there – no bubbles, no HHO.

There are various opinions on the type of electrolyte to use, but the most accepted and widely used are:

- Baking Soda (like Arm and Hammer) - Used because it's widely and easily available at local Grocery store. It is a "consumable" not a catalyst and does create Carbon Monoxide in the process, which is colorless and odorless and can be fatal, not my favorite...
- Salt/Saltwater – Popular, again because it's available, but it can create deadly chlorine gas, so I don't recommend it...
- Acidic electrolytes like diluted battery acids, citrus juice (not recommended), vinegars or the like. These have a tendency to "eat away" at the electrolyzer plates, which then have to be rebuilt after a few months. I found one guy who built his using lead bolts he hand made and fresh battery acid. He says he doubled his mileage, but then has to rebuild the thing every other tank of gas. Yeeeesh, what's the point?
- Sodium Hydroxide (NaOH) - Commonly used in Drain cleaners, referred to as a "caustic soda" and needs to be handled carefully, but works well in electrolyzers

- Potassium Hydroxide (KOH) – Also a caustic soda and used in drain cleaners. By far the MOST popular electrolyte used and my choice. I saw significant gains going from NaOH to KOH with my experiments. The downside is you can't just go into the store and buy it – you have to order it online or by from a local Chemical Supplier. You don't need much - a couple teaspoons, give or take a pinch.



Teaspoon of Potassium Hydroxide Flakes commonly used as the electrolyte in the Hybrid Water Power Cell

It's not consumed (like Baking Soda), it's a catalyst, so most of it remains in the Power Cell. All you do is top off with distilled water from time to time.

I found that after you have had it installed for a month or so, you may need to add a pinch more if your production drops at all (you can tell by current drop).

CAUTION: If you add too much electrolyte it allows a huge current draw from the battery, which increases HHO Gas production, but will quickly overheat your Power Cell and could melt the connectors on the lid. If this happens, plastic can melt in between the connectors and "insulate" it, making your Power Cell like a dead battery. So be miserly with the electrolyte and you will be fine.

This is one of those "Breakthrough" areas I have discovered. I can now run my Power Cell at even 40- 45 amps and NOT melt anything. While it's cool to be able to make over 3 liters of gas a minute, the alternator cannot keep up and will burn out at those rates.

So keep your cool and you will have a dependable Water Hybrid Power Cell and be the envy of your friends and family (Build it well, and others will PAY YOU to build and install for them, because you have the secrets!).

If you want to crank it up, [get a PWM](#) that puts out no more than 30 amps, you won't wear down your alternator that way.

We will discuss this further in the **"LET'S BUILD IT"** section.

The Bubblers

This is a **VERY important safety aspect** to your complete **"Hybrid Water Power Cell system"**. It is very simply, a separate tube or container of water (tap water is fine). It can be a larger one like I use (pictured below) or a smaller diameter container, even a section of thick vinyl tubing is better than no bubbler at all.

The HHO gas produced in your Power Cell, typically comes out of the Electrolyzer and goes directly into the “Bubbler” through a tube that extends down through the water to the bottom of the container.

The HHO gas then bubbles up through the water (through a separate tube), and is fed directly to the air intake of the engine.

This serves 2 Very Important purposes:

1. It “filters” the HHO gas removing any possible caustic soda traces before entering your engine, thereby allowing only pure filtered gas to enter, and
2. It provides a “Safety” feature against backfires from your engine or any possible flame traveling back the tube towards the electrolyzer. Any flame front is stopped at the water, keeping your Power Cell safe.

It should also be constructed with a Pressure relief valve to prevent against any possible explosions of the gas inside it.

The picture at the right is one form of bubbler made very simply from 2” ABS tubing and some end caps. The clear tubing is for monitoring the water level which rarely changes.

This one is the style I like because it’s robust, quick to make, and inexpensive. You only need to fill it about half full of water. I also put some stainless steel wool in the top to prevent foaming under vacuum from the engine running at higher speeds.

I have also seen reference to the ability of the “Nickel” in stainless steel to help “Pyrolytically” crack the HHO into even more refined hydrogen and oxygen gases. Copper apparently does the same thing, though I have not tested it.

This reference was apparently from a retired chemist who used to work at an oil refinery who said they used these metals in the refinery process to break the crude down into refined gases.

I haven’t verified this to be true or not, all I can tell you for sure is that I use the coarse Stainless Steel scrubbers available at Ace Hardware and **I SAVE GAS** with mine. The main reason for using them is to prevent foaming under vacuum from the engine- you don’t want that being sucked into your motor. We’ll go into further details in the instruction and construction part.



WARNING: There is a **popular Mason Jar design** on the internet, being used in some vehicles. This design does **NOT** encourage use of a bubbler which I find somewhat distressing and dangerous. It is your last place to stop any back fire from exploding your electrolyzer – eliminate it at your own RISK and Peril, but I wouldn’t recommend it if I were you...

Remember! The water also helps filter out any trace of electrolyzer before the gas goes into your engine, so don’t take any chances.

Let's look now at the available enhancements, both optional and mandatory. These can significantly increase your results. The first one, the O2 sensor enhancement is mandatory or you will probably see a loss in gas due to your car's computer.

If you don't use the O2 sensor enhancement, you must use the MAP sensor adjuster

This used to be a difficult fix, but new breakthroughs make it quick and cheap.

The Power Cell Enhancements

Now, let's briefly examine the **optional and mandatory enhancements** necessary when you add a Hybrid Fuel such as Hydrogen or HHO Gas to your existing car...

NOTE: Do NOT use these O2 Sensor Enhancements without having the Water Hybrid Power Cell installed on your car. They "Trick" your engines computer into running leaner which can cause it to run hot, especially under load or going up steep hills where your engine works harder.

If you DON'T have a Hybrid Fuel being injected in (like HHO gas), the result could be the burning of your valves pistons and other internal engine organs and guts.

Make sure your Power Cell is installed and running properly with no hitches, before installing any enhancements. I installed mine and ran it a week or two to make sure everything was fine and dandy.

Amazingly, I still got 21% increase in mileage without touching anything else (though I cannot promise that for yours).



The O2 Sensor: A Mandatory Enhancement!

We will go into this in more detail later, but I will give you a brief overview here.

The picture to the left is a photo of an O2 Sensor (Oxygen Sensor) from a 2001 Chevy Van.

You can see it was removed from the exhaust pipe (from the threaded hole directly behind the sensor).

What Are They Used For?

The O2 Sensor is used to measure the amount of oxygen coming out of the engine post-combustion, through the exhaust manifold. The sensor constantly monitors the condition and signals the cars' main computer.

If your car is newer than 1995, you have at least 2 of them. If it's fuel injected, you will ALWAYS have O2 sensors, They are what made injection reliable.

Depending on the condition of the exhaust gas (a function of heat, oxygen and as many as a hundred computer variables), the car's computer adjusts the amount of fuel being injected into the engine.

Normally, that's great as it makes things more reliable than carburetors. Unfortunately, it fights AGAINST any improvements made to the combustion cycle. Because we are making and injecting a **Hybrid Fuel** (HHO Gas), the sensor reads the additional oxygen in the exhaust as a bad thing (computer dyslexia for sure!) and tells the computer there is too much O2.

Measured and compared against all the pre-programmed variables, the computer thinks it's not burning enough gas, and so adds More Fuel. This can unfortunately result in worse mileage, not better.

That is the main reason fuel enhancement of any kind has not been viable for present day cars, kind of a "Built In Obsolescence" if you will. Efficient, but not adjustable, until now...

There are several ways to deal with these pesky sensors...

- **An electronic circuit** that connects in-line with the O2 sensor and converts the output signal from the O2 sensor as it gets sent to the cars computer. It essentially modifies this signal just enough to convince the computer that the car is running too rich on fuel (which is true!) and needs to cut back the amount being injected in, thus saving gas.



The only problem here is that you need a circuit board (EFIE – Electronic Fuel Injection Enhancer) **for EACH O2 sensor**. They can cost \$60 to \$100 each unless you can make your own from the free plans included in this book (Look in Installation and Instructions Section).

You can buy them already made for about \$60 from Eagle Research, but they take forever to get them to you.



For \$114 you can get a Deluxe dual EFIE from us. We found the best source and best product so [we now stock it here](#) – just scroll to mid page.

After a lot of time trying to find all the electronic parts to build our own, we decided it was best to just buy a professionally made unit. This is the only one we have found that allows you to insert a meter and manually adjust the voltage coming off the O2 sensor for maximum fuel gains. If you are on a tighter budget, get one of the bare circuit boards and place it in your own container, or up under the dash- one adjusted you don't really have to mess with them.

We like them so much that we now include them in all of our professionally made complete installation kits.

- **A Metal “Stand-Off”**, which removes the O2 sensor out of the main flow of gases, but still allows some to pass by and allows the heat to still transfer.



These seem to work well and only cost \$20 for a couple pairs. I put 2 on my upstream sensors, it only took about 5-10 minutes each, and I have had no computer error codes and am saving about 34% on my gas!

There is no circuitry to burn out or adjust.... Sweet! There is one problem I had with them – I had to drill out the inside hole just a little larger to accept the O2 Sensor. I used a 3/8” bit in my drill press and a little oil to lubricate the bit and it worked fine. I also found where you can buy them yourself locally for about \$5.00, if you have a drill press.

(Long Term Update: It seems after lengthy driving with these, some have noticed mileage increases diminishing – I think the computers are compensating. While they do help prevent error codes, my current belief is the EFIE's are still the best choice).

- **Aluminum Foil** - Even cheaper and simpler method supposedly works well for pre 1995 cars – a cheap piece of aluminum foil wrapped around the sensor and fastened with bare copper wire. (No tape as it will melt or burn next to the heat of the exhaust!) I have not installed this on any pre-1995 car yet, so I can't give you any feedback on this solution.



However, as part of our ongoing research, we are going to try this method on a later '98 Hyundai Tiburon, just to see if it works. We will probably compare it to a standoff and perhaps an EFIE circuit as well.

I will keep you posted...

A Side NOTE about the O2 Sensor Enhancement...

The first vehicle I installed an HHO Generator in was a 2001 Chevy Express with 5.7 liter engine. I hooked up and ran the "Power Cell" for a couple weeks to work out any bugs BEFORE installing the O2 Sensor enhancements, so I fully expected the mileage to go down, not up. I was pleasantly surprised to say the least.

I got a 20% improvement in gas mileage by JUST the HHO generator being installed, and it jumped to 34% improvement with the O2 Stand Offs on the 2 upstream sensors (nothing on the rear one so far), and an Exhaust gas Filter/Condenser.

This is NOT common from all my research. Usually the mileage goes down. Your experience may differ from mine. But don't give up if you install yours and don't get the mileage you want, until you try all the enhancements!

TRACK your mileage with each improvement – it will encourage you! If you need one, download the **mileage calculator** I made for you in Excel – it will calculate automatically after you feed in the numbers.

I spent a lot of time on the O2 sensor enhancement because of the importance of that issue. Please do not take it lightly, as it **will** affect your overall results.

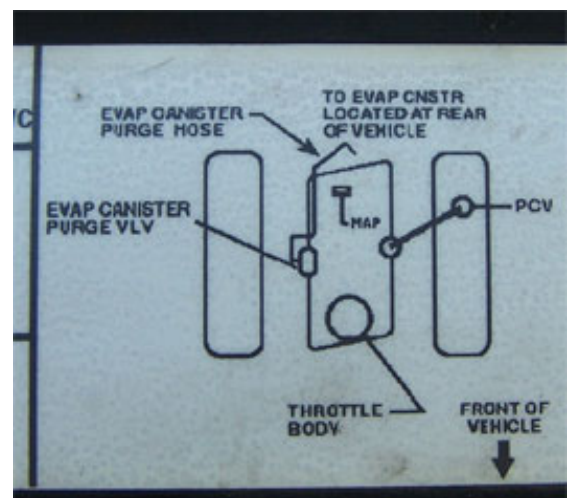
The Other Optional Enhancements

The MAP and MAF Sensor Enhancements

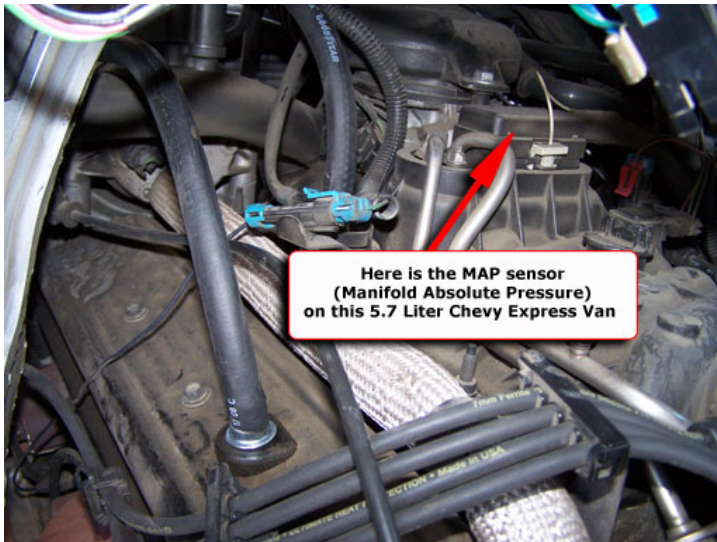
The MAP (Manifold Absolute Pressure) and the MAF (Mass Air flow) sensors are used to gauge and measure the condition of INCOMING air into the engine and the air pressure inside the intake manifold.

Again, they use electronics to communicate with the engine and determine the condition of incoming air so the computer can determine how much fuel needs to be added to the motor.

Think of it symbolically as a way to manually loosen or tighten a knob that lets the gas through to the engine... Here's a picture of where it is located on this Van.

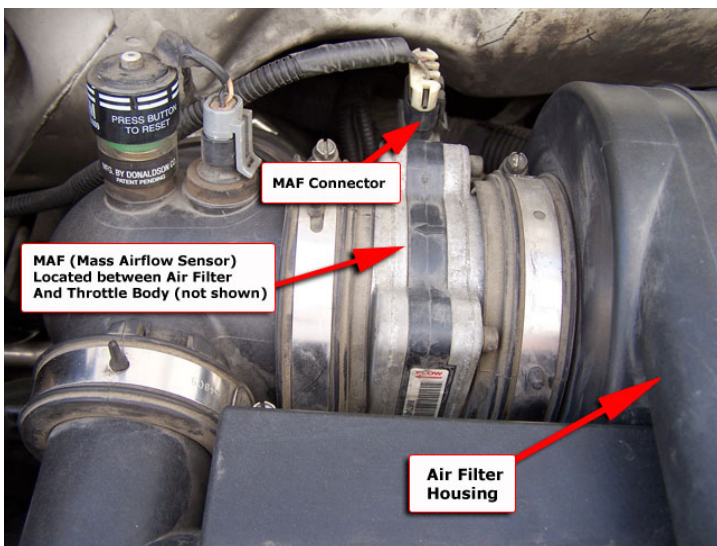


The photo at the right shows the position of the MAP sensor in relation to the engine. It is mounted on the intake manifold, towards the back of the engine on this one.



Here is a picture of the MAP sensor on that same vehicle...

It is easier to reach the MAF Sensor Enhancer. It is located close to the Air Filter, usually between the filter casing and the throttle body.



Though access is easier, the sensors in the MAF often operate at a higher frequency than the O2 or MAP sensors.

This makes it difficult if not impossible to just wire in a dial operated resistor (potentiometer). There are some companies that make MAP/MAF sensor enhancers and many cost only about \$70, which makes it a bargain for what it does.

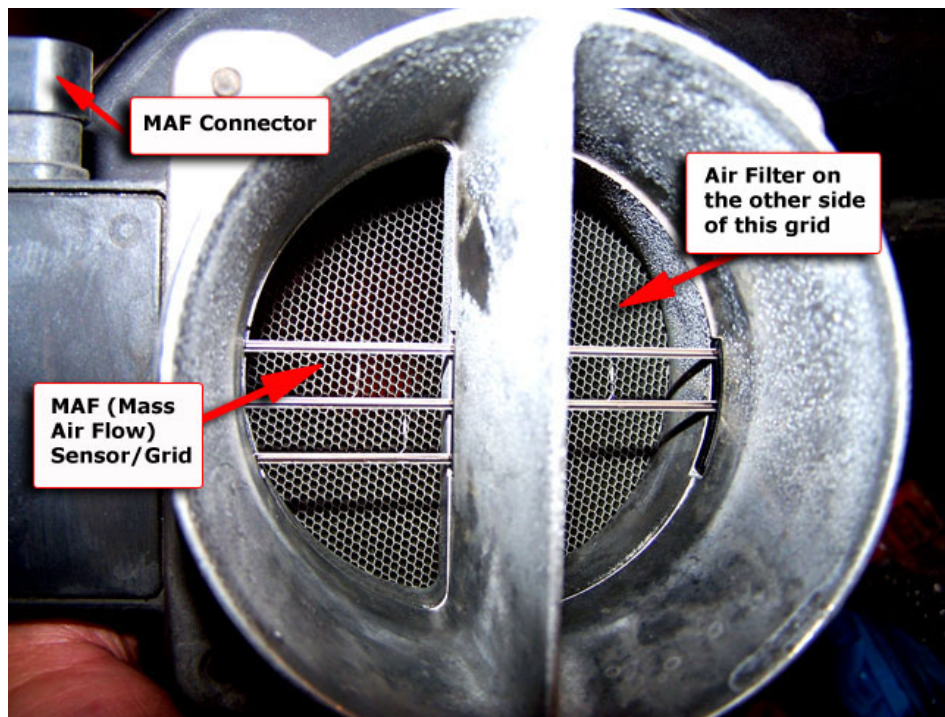
In the detailed section of the LET'S BUILD IT, I show a couple of inexpensive circuits you can make to manually adjust these sensors.

Or you can just buy one with a little more circuitry and control – it's your choice.

This is what the MAF looks like on the **outside**, **let's take a look on the inside:**

I removed the whole assembly on the left (in above) picture so you could see a unique perspective of this important sensor.

Now, I have to say that there are States that do NOT like you messing with the sensors. Some downright say it's illegal – WHY?



GREAT question, especially if you are actually making something that could result in a CLEANER exhaust than the present laws even require.

We would never suggest you openly break the law. The single digit IQ Politicians that make these laws will never change them if it doesn't put money in their pocket.

Perhaps the pain point of gas will cause otherwise disinterested people to take note of those in power who DON'T deserve to be there, and get rid of them next election – know what I mean?

I am just providing this as a point of information for you. How you use that information is up to you....

So that being said, there are many circuits available on the internet to “adjust” or give you the ability to adjust this MAF sensor.

I've included one in the Installation Part of the Book that was designed and posted by another experimenter on an energy related Forum, if you have a basic understanding of electronics, you can **easily** make one.

If you want to buy one to try and don't want to assemble it, I've included a few links in the

Installation Part of the Book – they are only about \$70 and can really pump up your mileage. This one from Protium Systems allows you to manually adjust for City, Highway, Performance, or Normal.



We will be testing these on some of our upcoming projects...

Those that use them swear by them as the most important part of the Hybrid Fuel Upgrade. You can manually lean out the gas to your preferences and use, or turn it off completely. Your choice, not the computers'...

If it scares you to SAVE lots of Gas using one of these, they are quite EASY TO REMOVE if you need to, for any reason.

(NOTE: Unfortunately, since the first printing of this book, Protium seems to have disappeared off the web.)

The Fuel Pre-Heater

This is another Optional item that some are using in addition to the others.

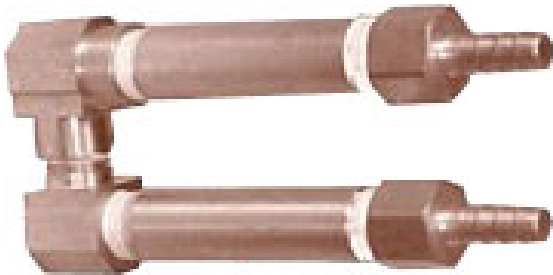
It is quite simply, a few pieces of brass or copper tubing inserted into your fuel line before it gets to your carb or fuel injection rail. It uses the hot water of your radiator to heat up the gasoline before it reaches your engine.

The theory is it is supposed to help the gas vaporize by raising its temperature to approx. 170-190 degrees (which is normally too cool to vaporize, but hotter than ambient air). This is a picture of one from our friends at Protium as well.



It looks to be a unique soldered set of copper tubing, and has a patent pending. They claim it can help by as much as 10%, but I have not tested it yet, but have plans to order it.

Others use threaded ½" or 3/8" brass fittings available at local hardware stores, that are pieced together to form a "U" shape, and then connected inline with the fuel. This version is then attached to the **outside of a nearby radiator hose** to transfer heat to the gas that flows inside it.



It MAY help a few percentage points, but we don't currently use them because the improvement doesn't warrant the time, in our opinion.

I DO like Protium's idea though. They claim a 10% improvement in mileage. It looks like it hooks up to one of the heater hoses is my guess. They're only \$50 and with gas at \$4.00+, it doesn't take long to make up the price.

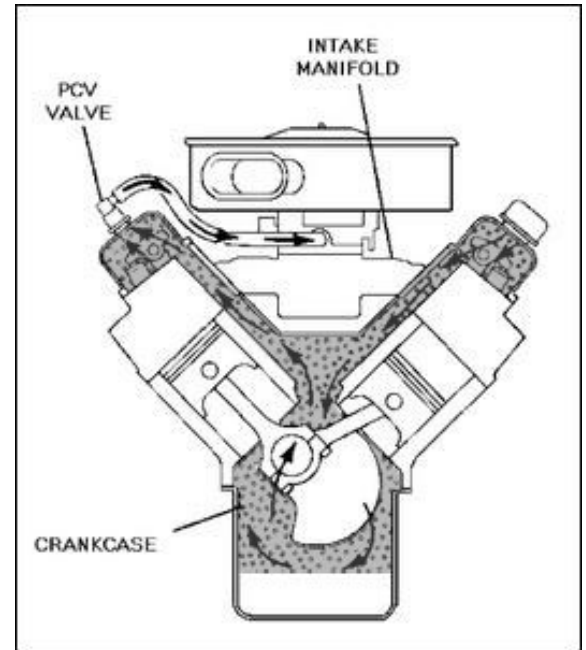
If it does add 10% in mileage increase, it's worth it!

The PCV Condenser

The crankcase ventilation system, often called positive crankcase ventilation (PCV), consists of a PCV valve, its vacuum hose or line, a supply hose providing air into the crankcase, and on some older applications, a breather filter to clean the air provided to the supply hose.

The purpose of this PCV valve is to regulate the flow of crankcase fumes into the intake manifold where they can be burned (Prior to 1963, cars had no PCV and used tubes that just left the hydrocarbon emissions from the crankcase out into the open air).

The PCV valve is also a check valve, to prevent flow back into the crankcase. This prevents potential ignition of the crankcase fumes, should the engine backfire. It is also crucial for proper engine sealing because it alleviates crankcase pressure, which can push out on seals and gaskets, contributing to oil leaks.



There have been various ideas, inventions and patents formed around the idea that the Exhaust Gas Recirculation through the PCV (Positive Crankcase Ventilation) valve, while a good idea, in practice it shows itself to be a messy gas grabber.

It is not unlike taking the garbage from the engine and feeding it back into the intake to help recycle what wasn't digested the first time. No filter – just blow-by gases fed back into the engine.

Kind of like you taking your waste and eating it, in case there were any nutrients left...UGH!

Nice sludge build up you have there!
Even HHO may not have been enough to clean this one up!



What it SHOULD look like (except for the frog...):



Clean Heads, no Oil Sludge Buildup

This is also a strong case for frequent oil changes, by the way. The top motor was shot – had to be rebuilt, obviously the bottom motor didn't.

So if you can filter some of that burnt exhaust that's being recirculated through the engine and condense the gas vapors, you should see a positive bump in your mileage.

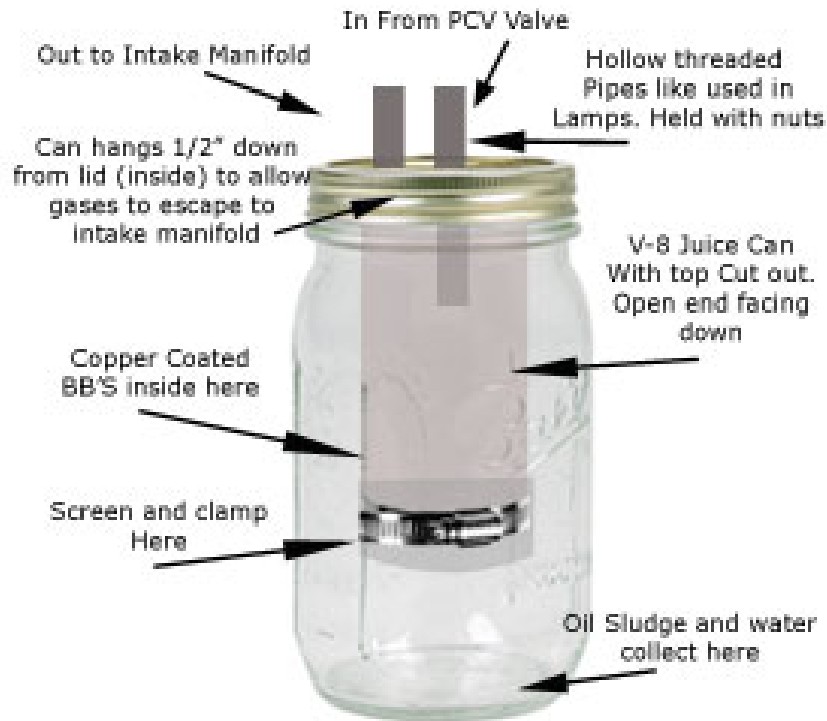
There are various methods to do this, many on the net in public domain. The one that has been around is one from KeelyNet about using two different size cans, one filled with copper coated BB's and then filtered. The balls condense (and possibly chemically crack) the hot exhaust gases into hydrogen and oxygen, and the sludge/water separate and fall into the mason jar, while the unburned, concentrated gas vapor can be returned back into the engine to burn.

The description is posted in the **"LET'S BUILD IT"** section, but is a little hard to understand, so I put a **very** quick little concept sketch together to help you understand the concept being described in the BBS posting. Sorry for the amateurish nature but I didn't have much time to spend on it...

Essentially it connects inline between the PCV valve and the engine vacuum on the other end. The hot exhaust gases condense with the BB's or bearings, and the water vapor falls to the bottom along with the sludge, allowing only condensed unburned fuel to get sucked back into the engine.

Why hasn't Detroit added something like this to ALL engines by now?

Below is the Illustration of the KeelyNet PCV JAR.



Quick Concept Drawing of the Keely Net PCV Jar

With this PCV Jar, the gases are sucked in through the main tube (From PCV Valve which extends into the BB's and out through the bottom (just window screening clamped on). It goes out from there and into the intake manifold to be mixed with incoming air and fuel and re-burnt.

Many are getting 10%-25% increase in mileage using some variation of this.



I use a smaller, easier to put together version learned from Ozzie over at Water4Gas, who has contributed his version into public domain.

He built one using a small "Husky" air filter (available at Home Depot) used for compressors to filter water vapor out.

Here's a picture of the 2 models available at Home Depot. I use the one on the left and have definitely seen increase – enough to warrant building a larger model!

Ozzie uses the smaller one – it's only \$11.00 so it's cheap. Ignore the plastic fitting on it- it was to test the size of the threads and I forgot to pull it out before taking this picture. ALWAYS use brass fittings as these are exhaust gases and they will melt things if you get my drift....

There's not much difference in size between the 2 interior "Zinc" filters, but a huge difference in containers. I like the saying "Go BIG or go home!" so you can guess which one I use.

I bought Silica Gel Beads from www.Grainger.com and stainless balls from Walmart to use in mine. Here's a close up of what they look like inside...

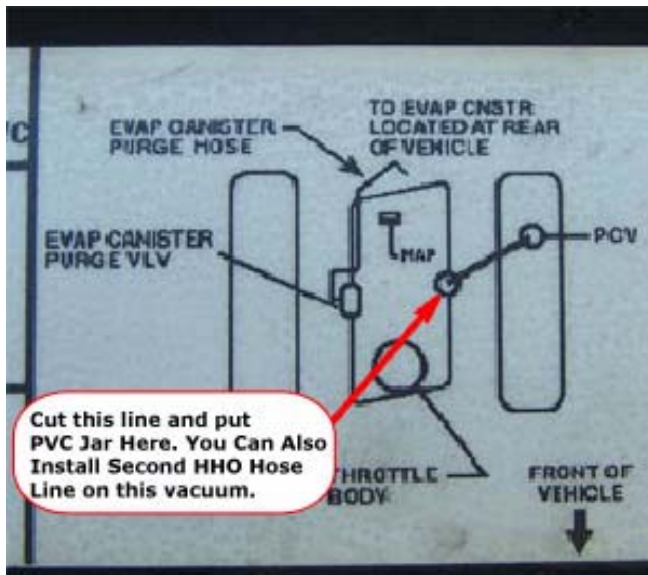
I also put some inside the zinc filter, but they seemed to clog up too quickly there, so I just leave them in the bottom.

Not shown here is the 2 layers of screening (regular window screening) used. I cut out 2 circles about the size of the black outside ring in the picture above, then pushed them down in tight on top of the beads.

This is to prevent any beads from being sucked up into the engine at high vacuum, just a precaution. There are a couple other things about this that we'll get into in the "LET'S BUILD IT" section.

When I added this and the O2 Sensor Stand offs (to my 2 Upstream O2 sensors) my mileage went from 21% increase to 34%! When I removed the ones out of the little zinc filter (not shown here), washed everything out with thinner and let it dry, put it back in, I got a total of 40% increase in mileage!

If you need [silica gel or other parts](#) we will be stocking soon at our store



Is it worth it? You tell me. I plan on building my version of an improved KeelyNet PCV Jar in the next couple of weeks – Bigger is better I think!

On this graphic to the left, you can see the hose which was cut to put the PCV unit in place. I bought emissions grade hose and ran it up closer to the front of my van for ease of cleaning and checking.

THE INSTALLATION...

So you've cut, sanded, prepped, glued, and screwed parts together and now you actually want to put it into your car and...

- See If It Works (If you built it the way I show you, It WILL)!
- Crank over your car and see if you notice a difference (You Will)!
- Test It Out and see if you save GAS (You WILL!)

When I first started doing this, the schematics available were not really up to par, and many left out key parts. There also were not clear written directions as to where I put what and with what part, which was a little frustrating to say the least.

Even the vacuum hook-ups were tough to understand, so I took some time to make it as easy to explain as I could. I hope the graphics will help you get a better understanding of a how a REAL, working Water Hybrid Power Cell is put together and installed so everything functions the way it was designed.

There are 3 different aspects to the **INSTALLATION of an HHO Generator**, They are listed in the order you should approach them:

1. The **Physical Installation** of the Hardware including Power Cell, Fuse, Relay and switch.
2. The **Electrical Hook Up** of all components – Power Cell and Hardware
3. The **Final Connections** which are the hoses to FEED the gas into your car's engine.

I will go into more specific details in the **"THE INSTALLATION"** Details (**PART THREE**).

For now, let's just get a glimpse of some of the things we'll be covering in more detail:

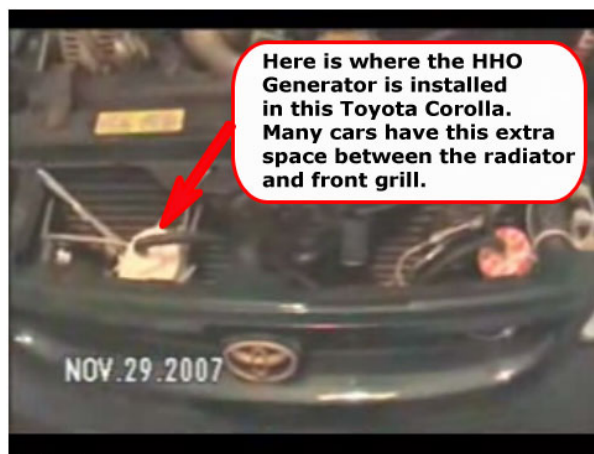
WHERE Do I Put IT?

It is impossible to be able to direct each of you who have purchased this manual as to the perfect location in your vehicle.

I wish there were a standard place that everyone could use and we could have standard brackets and standard wiring hook-ups, etc...

Unfortunately, the variety of locations is as widely varied as the selection of cars.

Some cars have LOTS of room; others have so much stuff crammed in that you can't even check the oil without great difficulty. Obviously, the older cars have way more room before all the electronics came in.



My first car was an old '68 Ford Falcon with a 200 c.i. straight six. There was SO much room in the engine bay I could practically stand in there. Contrast that with the picture above....

I'd like to get reader feedback on this issue! Perhaps we'll have a contest for number of posts of photos showing WHERE these can be installed in a large variety of vehicles.

Your feedback and photos will be invaluable to helping others visualize WHERE to put these in a large variety of models and styles. I am still developing the idea, but I think that the "Open Hood" discussion would be hot; even if it involved just getting pictures of peoples' engine compartments with suggestions as to where the HHO Power Cell configuration could fit (even before you build it).

Maybe builders' could just use the container body (doesn't even have to be complete) to show how it WILL fit. Get 2 or 3 photos showing it... Let me know your thoughts on it, will you?

Decide WHERE BEFORE You Make Your Container!

In the "LET'S BUILD IT!" section with all the details, I recommend doing this exercise early on. Sometimes you have to open the hood and really examine things for awhile before you make a firm decision.

There are a **few KEY things** you have to remember when looking for a place to install:

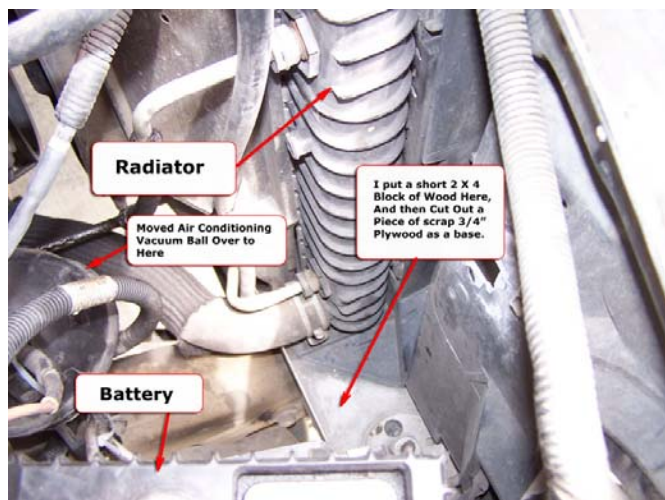
- Extreme Heat (Not good)
- Supports and Bracing Issues (Please Don't just strap it in with Bungee Cords as some suggest).
- Position if at all possible to be able to see the Water Level Sight Tubes
- Can you get to the terminals to check for tightness and electrical connections (sometimes they can loosen up if it gets too hot)
- Lastly, Can You Easily Access to ADD Water (MOST IMPORTANT!)

Supports and Bracing Issues

This is a little trickier and takes a little ingenuity from you. If you have trouble, call a friend or relative who is handy with their hands – but if you've built the electrolyzer I'm guessing you have the skills...

I found a perfect place for mine in this Chevy Van.

We discuss it in more detail, later.



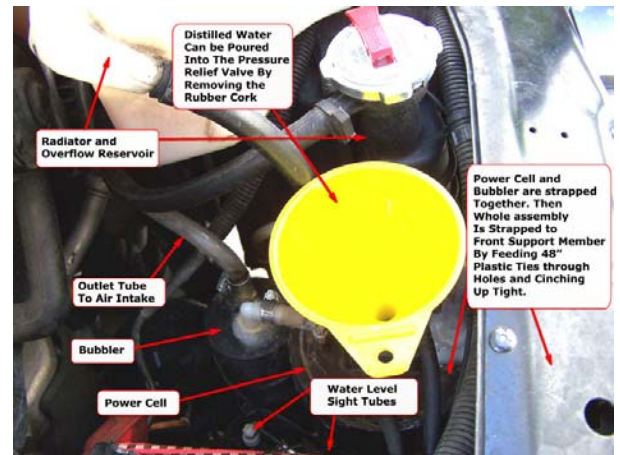
Positioning

It takes a little figuring but there's always a way.

You need room for the Power Cell and Bubbler, room to be able to see the water level in the sight tubes if possible, and room to check the electrical connections from time to time.

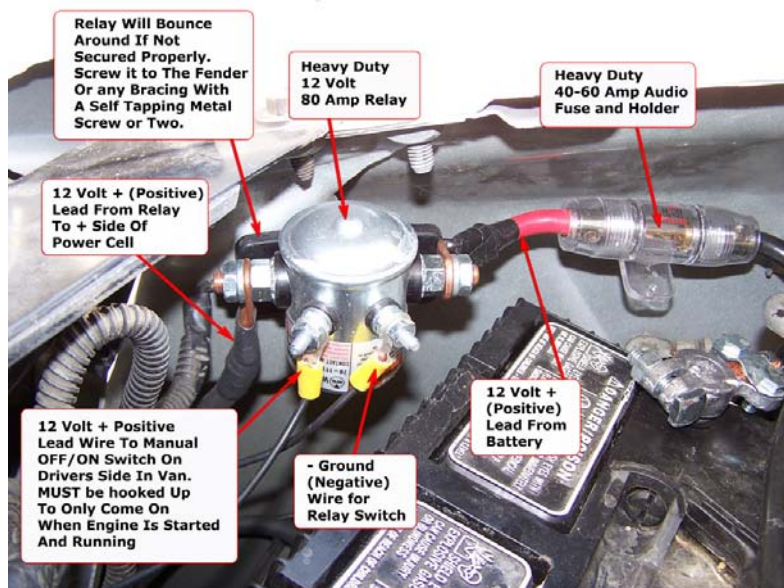
Most importantly, you need access to keep the water level maintained.

This is how that same install works for access....



Mounting the Fuse, Relay, and Switch

Another thing really not covered well in other books and videos available are these little essentials of fuses and switches. I have photos, videos, and detailed illustrations to help you understand this process in the INSTALLATION section.



We'll go over what you **SHOULD** use and what you **SHOULD NOT** use when it comes to wiring, relays, and fuses. This is a critical component and getting it wrong could cause a fire, ruin your Power Cell, or any number of things.

Here's a Photo of an install, in the next section we will get into different schematics and perspectives that will clarify for you.

I go into great detail for a reason – I want you to have a Positive experience here. I want you to start **SAVING GAS**. I want others to do it too.

If your generator works, others will get excited about it and want to build one, saving money, saving **GAS**, cleaning up the environment. Everyone wins that way.

Speaking of getting others excited about it - Feel free to recommend this book while you're at it – sign up as an affiliate and you earn \$60 for everyone you recommend that buys this system!

[Click HERE to learn how](#) you can get this book for FREE, by recommending it to just 2 friends or relatives!

INSTALLATION – THE WIRING!

Many do it yourselfers are great builders and constructors with the hardware stuff, from woods to plastics to metals and everything in between, but electricity scares many.

But follow these easy to understand wiring illustrations I have made and you will amaze your friends!

For those of you with electrical background, especially the electronics field, please forgive my deviation from normal diagrams and schematics. I read them and understand them myself, but I know many who draw a blank when it comes to translating a working electrical schematic into physical hook ups.

The VISUAL MAP

I designed these to be used as visual Maps, with a path connecting everything. There's a start and finish and everything must connect in between to get to the end. That really is how electricity works- it flows out one side of the battery, through the path all the way back into the other side.

You stop it by putting a "Gate" in the path, which is a switch or fuse. Open the gate and on it goes happily scooting along the road you've made. An electrical short would be like someone carving a dangerous path up to the road and putting a fake sign that says "This way to Grandma's house". Electricity gets mad when it's let off the good path, you don't want electricity getting "short" with you.

So much for little primer on electricity – doesn't sound so ominous anymore- does it?

This circuit illustrated on the following page, represents the common, basic circuit that is used in most "Brute Force" installations.

I have illustrated it as a "Path" for you to follow. **I recommend you first do all the hardware installations** as outlined, first. Get everything located and anchored into place, that way you can cut and install wires as short as possible and be able to route them away from moving or hot parts of the engine.

You WILL Be Showing This Off!

Believe me, You WILL be showing this off to family and friends! You Will totally amaze them with your new found knowledge and expertise on this subject! I show several people a day.

So do us all a favor, and take the time to make a nice installation. You don't want to open your hood to a jumble of tangled wires that look like they're going to some homemade bomb.

So do a respectable job so others will be interested enough to build one! **There will also be plenty of people willing to PAY YOU to build one AND install it in their car,** IF you do a professional looking job. So take some time to do it right and it could very quickly bring you extra cash!

Here's one of the illustrations I made to help you understand the process- you will see it full size in the **INSTALLATION** section...

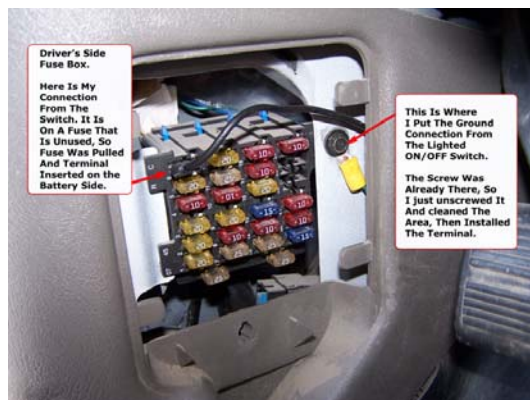
As you can see, I've illustrated it step by step for you so there will be no confusion on your part.

Just, follow the steps as outlined, starting with Step One and you will have a safely wired HHO generator making Gas and saving you MONEY!

If you need [electrical stuff like relays and fuses we will](#)

[be stocking them here](#)

Hooking Up Your Ignition Switch into the Circuit



This is a photo from the drivers' side fuse panel. We'll go over how to hook it up with a manual ON/OFF switch and even get into finding the right fuse!

Once you have located the correct fuse terminal, the rest is easy.

START IT UP!

We'll go over the procedures for start up and how to quickly double check everything both before start up and then after you crank it over and run it.

There are sometimes adjustments that have to be made in the electrolyte levels and you won't know it if you don't follow our easy to use checklist!

I give you a numbered list to go right down the line, tell you what you should be looking for and give you details in numbers and meter readings – even discuss where to put the meter leads to get correct a reading!

Did you know if you place your meter leads on the wrong terminals with the wrong setting you can blow your meter fuse or even ruin it?

I detail everything for you so you know what you're doing on this install! There will be no wiring mishaps if you follow my instructions!

INSTALLATION – Hooking Up the HOSES!

This is another critical area that very few cover, most do it with poorly drawn illustrations or schematics that are great – if you are an engineer!

I've created a graphic that you can use to better understand the routes available to you.

Again, rather than making it in an engineers layout (schematic), I've drawn it as a path to follow, just like the electrical hook-up, but without the numbered steps.

Here's a screen shot of the detailed vacuum hookup main illustration. Again, we will discuss all of this info in detail in **PART THREE** of this manual on **"THE INSTALLATION"**.

This is pretty straight-forward, and easier to understand and explain than the electrical.



We will discuss the ins and outs of this critical part of the installation – just like electrical there are things to do and NOT do.

We also discuss the single hose hook up compared to the dual hose and the advantages and disadvantages of both.

In the illustration above, I will show you everything separated and obviously not to scale for ease of understanding.

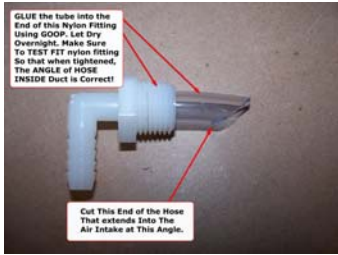
I will also get into great detail about the dangers of making hoses too long or using the wrong kind of material which could make your engine fail or even cause a fire!

This is a thorough discussion of everything you will need, to do it right from the get go. No guess work. No fears of getting wrong; just clean and simple language to get you up and running as quickly as possible.

The VENTURI Effect

If you are familiar with carburetors, you know what the Venturi Effect is...

Venturi Effect -- The speedup of air through a constriction due to the pressure rise on the upwind side of the constriction and the pressure drop on the downwind side as the air diverges to leave the constriction.



Huh? If you're not familiar with it, that's OK. You don't need to understand it to know its effect. Briefly, if you cause a rapid air flow around a tube, the air will speed up as it goes around it creating a vacuum in the tube itself.

This is how ALL carburetors function. They have little fuel jets (tubes) inside that the air stream flows around and "Draws" out the fuel to mix it with the air before it goes into your engine.

I will teach you how I Prep my fittings that go into the Air filter or surrounding housings.

This ONE FEATURE can make or break your success with an HHO POWER CELL!

In this first illustration, I show you what is happening inside your filter.

With a flat cut hose, (which I suspect is what 99% of experimenters use) or just a fitting screwed into the housing (they both have same effect), largely wastes the force of air coming in over the top.

I call this a neutral flow situation. If you have a decent HHO Power Cell, it can work, but not nearly as efficient as it could be.

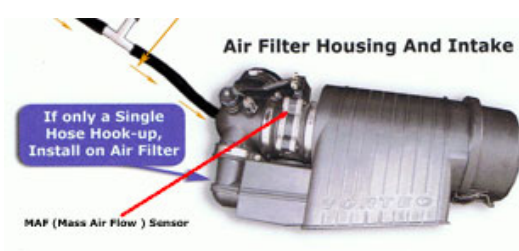


HHO generators do not put out a lot of pressure (by design), so the massive amount of air being sucked in to your cars engine can easily overpower the ability of the HHO gas until it builds more pressure.

Most people who use fittings (which I definitely recommend) will tap them straight in, not thinking about this important feature.

So we will look at how **NOT** to install the hose into your air filter housing – **because if you install a flat hose just sticking in the filter housing, or you install it angled the WRONG WAY**, you will get lousy or no results in mileage from adding an HHO Power Cell to your car!

WHERE'S The Best Place To Put The Fitting?



We'll even get into a detailed conversation as to WHERE to put it into your air filter assembly! Has anyone discussed this in detail before? We haven't found it talked about at all, other than a few quick words, then onto another discussion...

Truth is, there are some who have experienced problems in just WHERE they insert the tube. Moving it just a few inches suddenly made all the difference! Don't take any chances – we'll explain it all thoroughly so you won't have any problems.

You will learn everything you need to know to get success out of your system! We WANT you to succeed, otherwise I've just wasted many hundreds of hours in research, testing and compiling all this information for you.

The START-UP!

In this section we will cover all aspects of getting your car running, getting the right mix, getting the right current flow and even the effects of engine vacuum on a generator! These are ALL important to understand the dynamics of what's at work here.



One example of an HHO Generator. Here it is just before turning it on, doing a test in the car.



Here it is as it begins generating HHO. Notice the amount of foam and bubbles generated.



And here it is with the car running. Notice the effect that car vacuum has on the production. This is why you leave space at the top for HHO.

Here's an example of engine vacuum and its effect on HHO generators. I always add a vacuum check valve on mine because it does allow some external air in to help prevent foam from being sucked into the engine.

This is not the design I show you in the manual, but another experimenters' test rig. I only use it to demonstrate a principal for you.

Measuring Performance



In this section, I have included videos of my initial tests and measurements, as well as some photos and instructions.

When you first start it up, it's a good idea to get a base reading of current being drawn by your HHO Power Cell.

You need a Good Meter to do this. Most do not measure above 10 Amps, so if you try to measure above this (yours is designed to operate in the 16 -20+ amps range!), you WILL blow your meter or the fuse inside.

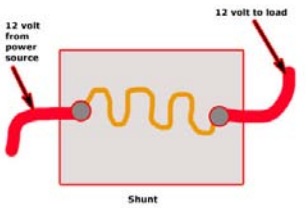
I invested in a nice meter from Grainger. It was only \$49 and allows me to measure up to 20 amps. It also allows the measurement of Temperature and comes with a wire/probe setup – you just touch the end to whatever you want to measure and it gives reading in real time.

This is an EXTECH model 410, comes with meter, probes, and temp sensor.

Even at 20 amps, I blew my first fuse because I was drawing about 30 amps on mine (I have made some revisions which I can't talk about quite yet that allow me to run as high as 40 amps without overheating or melting anything).

You really DO need a way to measure your current if you want to understand thoroughly what is going on. If performance drops you can quickly tell if it's about the current or if it's the hardware.

If you're not sure – you're just guessing! Why waste your time when I outline it all for you?



Measure Current by connecting 12 Volt + lead to one side and another power lead to load on the other side. Do NOT try to measure current by using red meter lead on one side and black on the other of this shunt, you will only be able to measure voltage that way.

I will show you how to make a cheap or even FREE instrument (from spare parts sitting around your house!) to use with your meter.

You will be able to measure 30, 40, 100 amps of current using this FREE little device you can put together in minutes! I will teach you not only how to make it, but how to calibrate it AND how to USE it.

Nothing will be left for you to try and figure it out- everything will be clearly explained in our section on INSTALLATION.

A device like this could cost you the price of this course if you bought it at an electronics supply house. You get it for FREE or a few dollars at most (if you don't have the spare parts laying around).

As always, if you need something and can't find it or want to just save money and buy everything at once [go to our online store](#) we are putting together to help you save time.

My Personal Breakthroughs!

In the course of my research and experimentation, I have discovered some cool breakthroughs that fix this problem and can personally run my Power Cell at 35 – 40 amps without GETTING HOT or melting the cap (though I choose about 30 because of load on the alternator).

Mine can put out about 2.5 – 3.0 liters per minute – check out the videos included with this manual! If it turns out my improvements are not patentable, I will freely share them with the all who purchased this course.

If they're patentable (as suggested by a friend of mine involved in this area professionally), then I need to finish patent applications and get those processing first.

By the TIME You Finish You Will Be Able To SAY “I DID IT!”

Hallelujah- Success! You will be excited at this point because you've constructed and installed your very own Hydrogen Gas Generator using parts readily available to everyone. You will find a ton of people, friends, neighbors, and relatives that either want you to build them one, or build and install one, or want to know how you found out about it.

You could create a side business just building and installing these units in your area, as gas continues to skyrocket out of control, people are screaming for ANY solutions – you have one now.

In Fact, You Probably have the ONLY quick solution to a major problem. I had one friend who saw my first install, and he immediately called his friend who owns a large Meat Packing/Delivery business.

His profit margins are so tight that he told me that if I could just save him 5% on gas, he would pay me to BUILD and INSTALL them in ALL seven of his vehicles AND his Escalade! When I told him I was getting 40% on my big 5.7 liter motor, his mouth hit the floor!

We will be putting together kits and parts available here for your convenience. If you are planning a lot of installs, we are making our professional grade, [pre-assembled units available here now](#). Sign up as an affiliate and get almost \$100 off our complete kits – wholesale them or mark up and install them yourself. Email me for more info at support@hhokitsdirect.com

Think of the possibilities that could open for you...

Whatever you decide, whether to build and install in your own vehicle and for others, just build them and sell completed units, or make money referring our system, we wish you all the success you can handle!

In this environment with economies fluctuating wildly around the world, this is truly an answer to people's prayers. You can meet the needs of so many who are hurting because of the enormous price increases in fuel, as well as make a huge contribution to cleaning up the environment everywhere, AND subsidize your income or start a business doing it!

The possibilities are as vast as the choices you make. We encourage you to go for it with gusto, and make a difference in your life and those you love!

We will constantly be monitoring and reporting on the newest breakthroughs in experimentation and research in this industry!

As a Private Member you will have access to results and up to date info AS It IS RELEASED, you'll be on the cutting edge!

Even this morning, as I write this, there are MAJOR developments happening in this industry! HUGE BREAKTHROUGHS! I mean, Monster HHO output breakthroughs! As soon as more details emerge over the next few weeks and months, I will let everyone on our email list know what's happening.

I suggest you be there...

Help Us Spread The Word!

We want this technology to spread across the land and around the world. The major Media has all but ignored this exciting industry, trying to marginalize it as a scam, a spoof, not worth trying.

LIARS! **It DOES work!** Just build it and SEE for yourself!

People everywhere are powerless to deal with this vital necessity (even in Europe they're spending almost \$10 a gallon!

This is right now, the ONLY technology giving measurable, gas-saving results and it is an IMMEDIATE way for people to begin saving money. You and those you know do NOT have to wait for 20 years for Hydrogen to become fashionable and widely available.

You can make it available NOW. Will you help us spread the word?

We have made it easy for you to be able to recommend this HHO Manual and system to anyone you know AND if they buy it too, you can earn as much as \$60 from each book!

GET THIS SYSTEM AND A POWER CELL FOR FREE!

How? We pay the highest affiliate commissions out there. Get a few friends to buy this book, and you've paid for the manual AND your Water Hybrid Power Cell essentially getting them for free! How cool is that!?

Find out how to get the manual AND the Power Cell for FREE, [Click Here!](#)

Thank you for purchasing this system, and taking the time to read through and hopefully build and install your own Hybrid Water Power Cell.

We'd love to hear from you on your thoughts and results. Even if you just liked the manual and felt it answered the right questions for you, your feedback is important.

Please **email** us at < > and give us your testimonial and feedback!

And don't forget to check out our other books and articles included with this manual!

If you don't have time to hunt around for [all your parts, we sell a box](#) of them ready to assemble. Fully assembled units are now available as well. [Check them out here.](#)

The SHOPPING LIST

The [Shopping List](#) is available with the other bonuses at the private member downloads area where you downloaded this book. I put it together to help you when you need to go gather everything.

The Other Books and Manuals INCLUDED FREE....

(All Material listed below is also available at the private member downloads area where you downloaded this book.)

The FREE O2 Circuit Board DESIGNS AND SCHEMATICS

Two designs and schematics for making your own EFIE (Electronic Fuel Injection Enhancer) to deal with the O2 sensor. A MUST read if you want to build your own.

Make Your Own Distilled Water For FREE!

A collection of Solar distillers you can make to distill your own pond water, creek water, hose and tap water, rain water or whatever. Includes the quick TEN MINUTE SOLAR DISTILLER you can make with a 5 gallon bucket!

How To Build Your Own HHOMeter to measure Gas Output

Important if you want to build and install multiple units – great cheap way to measure the efficiency of your designs and builds!

CAN You Run A CAR JUST on WATER?

One man did and others are trying to follow...

The Complete Run Down on the JOE CELL

This 100+ page book explains every detail if you want to travel this route. Fact or Fiction? You decide...

High Mileage Inventions - Suppressed or Supposed?

You always thought it – especially with our current out of control gas prices. Now learn the facts in this collection of articles and patents I put together for you.

A list of great discussion groups you can join

Any serious Hydrogen/Alternative energy researcher needs to keep abreast of current breakthroughs in technology.

YouTube videos you Really Need to Watch!

I've compiled a short list of what I consider important You Tube videos I think are worth your time

Our Own Private Videos

This is a collection of over 11 DVD's worth of video that were shot during the making and installation of some of our Power Cells.

Be Sure To Download the Excel Calculator To Chart Your Mileage Gains!

PART TWO – “LET’S BUILD IT!”

Here are the Details and specifics to reference and learn from as you BUILD your Water Hybrid POWER CELL! If you want to build but don't want to spend a lot of time seeking parts, [you can buy a box of everything here](#).

The Guts of The Power Cell And How They Work

Building a Water Hybrid Power Cell is Quick and Easy. In fact, it's so EASY, so SIMPLE, I really cannot believe that we have not known about this sooner.

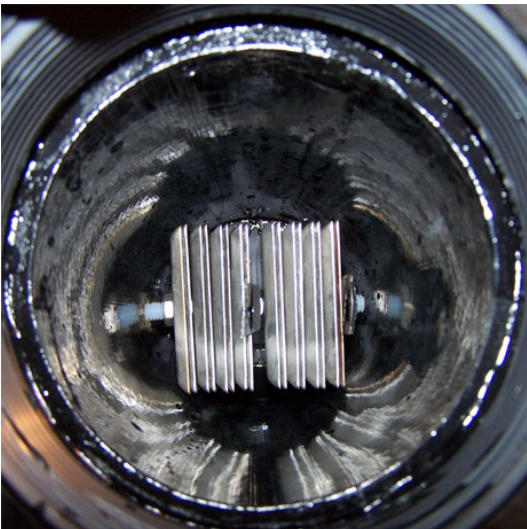
While Detroit is trying to keep up with Hybrid engine technology that adds \$8000 to \$10,000+ per car (and only adds 15%-20% better mileage!) experimenters around the world are getting BETTER results for less than a couple hundred dollars (for a full blown system!) using ONLY WATER!

I personally got almost 22% INCREASE in my mileage on a ¾ Ton 2001 Chevy Express Van with a huge 5.7 liter motor, with the HHO Power Cell only. No other modifications to O2 sensors, no additives, nothing.

In less than 2 hours it was installed and in my vehicle saving me gas – to the tune of \$120 a month! Since adding the other enhancements, I've seen as much as 40% improvement! I'm currently saving OVER \$200 a month at present gas rates of over \$4.00 per gallon.

This is why we must all do this ourselves. It's Quick; It's easy. And it can be done by anyone who is somewhat handy with their hands and has a few tools in the garage. AND it can be built RIGHT NOW! Today. It can help you save money TODAY. Not three months from now, not 3 years, but right now.

With \$4.00 a gallon gas, we cannot sit around and wait for empty promises of better technology coming 10 or 20 years off.



A view into the container

It's up to us individually my friends!

We now have the technology – it's here.

We have the water, it's all around (even if you have to collect rain water and distill it for FREE yourself- see the Solar Distiller Book at the End of PART 1).

ALL the supplies to build it are READILY available at your local hardware and building supply stores.

What are we waiting for - \$12 a gallon gas?

The BASIC DESIGN ISSUES:

As mentioned briefly before, Electrolysis occurs when 2 electrodes are submerged in water and current/voltage is applied (remember the glass of water and battery?). The amount of HHO gas made is directly tied to the following design issues:

The number of plates and the surface area of those plates- (A hundred razor blades are not going to work as well as 16 Stainless Steel electrical cover plates).

The water- (distilled is BEST- do NOT use un-distilled rain or pond water or you will quickly have a green or rust slime covered mess inside your Power Cell – it will probably ruin it) Tap water is not recommended either because of traces of chemicals used to treat it – like chlorine which becomes chlorine gas which can be deadly poisonous.

The Electrolyte – Water by itself will not conduct electricity – it's an insulator at the levels we work with (12 volt D.C.). An electrolyte is used to enhance greatly the amount of HHO gas produced using the same amount of energy. Most successful builders use KOH or Potassium Hydroxide, a caustic soda.



Next down is NaOH which is Sodium Hydroxide also a caustic soda like what is used in Drano and other drain cleaners.

When I first started, I bought some crystal drano to try it. It does work, but there are other ingredients which make it difficult to use and dissolve completely.

You can see the reactionary flakes that give off the Sodium Hydroxide in the picture to left (DRANO). I don't recommend it, but it works if you have no other access to an electrolyte.

It will leave a blue gel like substance at the bottom of your Power Cell, and you MUST pre-dissolve it before pouring in.

The KOH (Potassium Hydroxide) can be bought from www.ArtChemicals.com. It comes in Lab grade flakes and dissolves quickly and completely in distilled water. It is very concentrated and only 2 – 3 teaspoons are needed to get your Power Cell working at peak efficiency. It's the one I use and what we include in our kits.

Another option that some are finding has promise is the use of distilled vinegar, we plan on exploring this more as time goes on.

Apparently some guys who have been installing these for the last couple of years have found that white distilled vinegar is great for cleaning out the build-up in alkaline based cells – used it for flushing them out. Now they run straight through as the electrolyte!

The Voltage and Current Applied- Now, since this is going in your car, truck, or van, you're limited to the amount of voltage you can apply. The standard Battery is 12 volt, but with the alternator running, you'll get anywhere from 12.5 to 14 volts on average, so that is pretty well fixed by the voltage regulator on your alternator.

But the **current**, which is the REAL workhorse in the basic "Brute Force" Electrolyzer designs **IS adjustable** (which is what we are making), and very simply so.

You can adjust how much amperage your Power Cell draws, simply by adding more or less electrolyte (assuming design is proper of course). MORE electrolyte= MORE CURRENT and Vice Versa. You can literally put so much electrolyte in your cell, that it will MELT the lid of that baby and ruin your connections.

Ummmm – ask me **HOW I know that?**

The BEST HHO Gas Power Cells are a Perfect Balance of these 4 Critical Design Elements!

Alright, we'll proceed with the first and most important one...

The PLATE STACK- General Info

Before we get into the details of this particular stack, I would be remiss if I didn't mention the recent advances in electrolyzer technology. The internet has opened up a world wide lab and discussion group that cannot be controlled by the elite few who in the past have prevented the wide dissemination of knowledge.



While the majority of experimentation is done around the world with Brute Force Cells immersed in a container of electrolyte (Wet Cell), there are a few researchers that are pushing into the Dry Cell configuration. This is a variation of the man who really broke ground with HHO Gas research back in the late 1960's and 70's. Yull Brown, which is where the popular name "Brown's Gas" is derived from, created and patented super efficient Dry Cell designs that were so efficient, he made a welder type "Water Torch".

I discuss it more in one of my additional FREE books included at the end of this Manual.

The Dry Cell essentially stacks large plates of Stainless Steel together with gaskets around the perimeters. The electrolyte flows between the plates via holes in tops and bottoms of each one. The gaskets hold the electrolyte inside, so on the outside, the stack is dry. This one is a **sidyoung** cell from YouTube. He has some phenomenal work in this area- check his work out for more info.

This area has some real promise and advances are being made everyday. It is more complicated than the Brute Force Wet Cell design we are learning about here, and is not really for a beginner. I recommend getting your feet wet first with a simple plate stack so you can understand the forces at play, then move into these other areas...

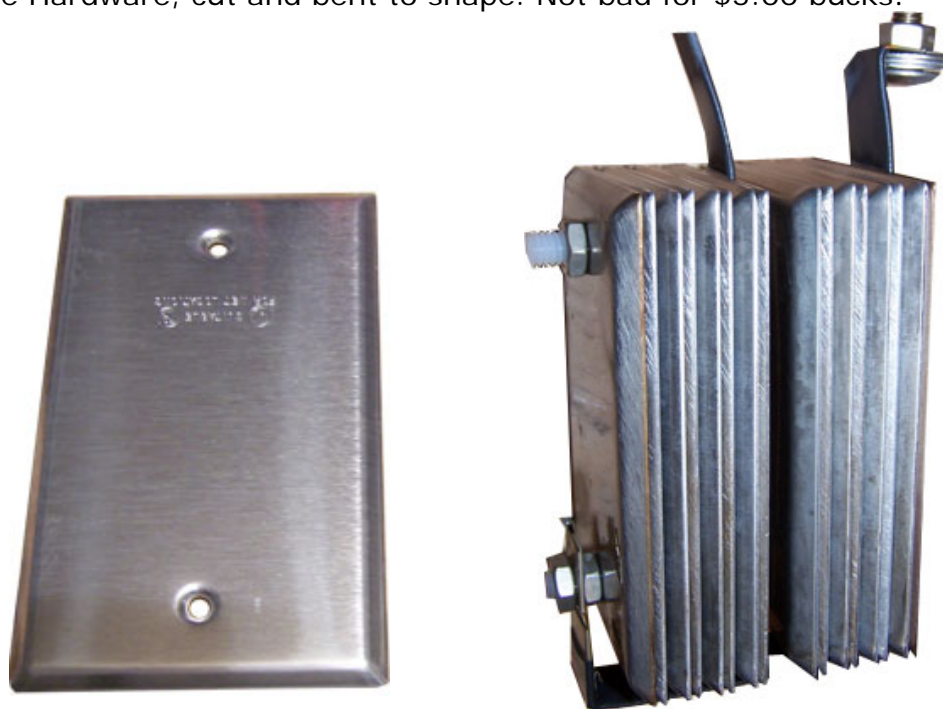
We have been experimenting with our own breakthrough designs in this area, and may soon have our won breakthrough in this arena. Sign up for our [free email course](#) to subscribe to our newsletter and notification of breakthroughs.

The PLATE STACK

Let's look with more attention now at the Plate Stack design touched on briefly in the first part of this book. Since it's where all the action takes place, it would be good to have a deeper understanding of the prep/assembly/action that takes place within this component.

Here are a couple of photos. The first is a stainless plate, the second is a look at the assembled plate stack. There are 16 in all, the holes normally used to screw them to the electrical box have been drilled out larger, and 2 nylon threaded rods, nylon washers, and stainless nuts are what keep it held together nicely. It has come to our attention that it is sometimes hard to find enough of these in stock, [so we will be buying them bulk and selling them here](#).

Oh, and the two stainless straps connecting everything are made out of Stainless Steel BBQ Tongs from Ace Hardware, cut and bent to shape. Not bad for \$5.00 bucks!



16 Stainless Steel Electrical Cover Plates ... Are bolted together to change Water into HHO Gas

The heart of the device, (the "Guts" of the Power Cell) is shown above. It was designed initially by Patrick Kelly and is genius in its simplicity and design.

The plates are **specially prepared** (Make Sure to DO THIS as outlined for maximum effectiveness) and then assembled as shown.

The HHO Gas is created in between the plates through electrolysis. This is just like the 9 volt battery in our **CHEAP 2 MINUTE PROOF experiment** in the first chapter, except these plates are hooked up to your 12 volt car battery and make a LOT more gas!

The Hydrogen and Oxygen Gas (HHO Gas) is ONLY made when you start the car. The second you turn the car off, it stops making HHO. Whatever little remaining gas is in the container gets sucked into the intake system where it quickly dissipates.

Nothing is stored inside the Power Cell when system is shut off – making it far safer than expensive “Hydrogen Only” type cars.

This particular assembly of plates was chosen for several reasons:

- The 304 Stainless Steel Plates are widely available at home improvement centers.
- The holes are pre-aligned and pre-drilled, needing only to be enlarged. This gives a great alignment and consistency to a hand-assembled electrolyzer – making it function extremely well.
- This configuration was designed to fit perfectly inside a 4” ABS or PVC Pipe, making the container readily and widely available for all.

Remember, even a battery dropped in water will make HHO gas (at least for a short time) but not every set of metal plates will last immersed in an electrolyte. You could play with metals for a quick demonstration, but just don’t plan on them lasting long at all.

I mentioned one man who made his own lead plates and got terrific results. Unfortunately it only lasted through one or two tanks of gas, then had to be completely rebuilt because they had dissolved. Not too practical, eh?

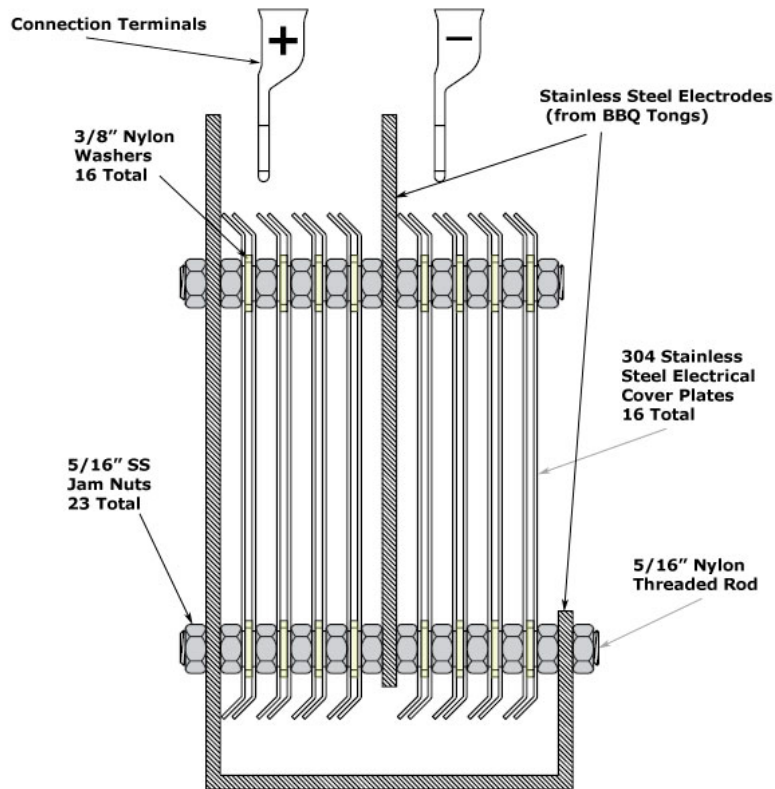
You can try whatever you want short term however, for longevity, it is Critical to use **Stainless Steel**, not aluminum, not galvanized, not carbon steel, not copper, silver, etc or it WILL corrode in the electrolyte leaving you with a mucky brown slurry of a mess.

The electrical blank cover plates that are recommended in this design are made of 304 stainless steel. The most commonly used is 316L stainless which lasts a long time in the severe environment of alkaline or acidic electrolytes. Unfortunately, the plates only come in 304, but that’s OK. The only slightly noticeable effect is a little iron oxide leaching out of the plates after a lot of service.

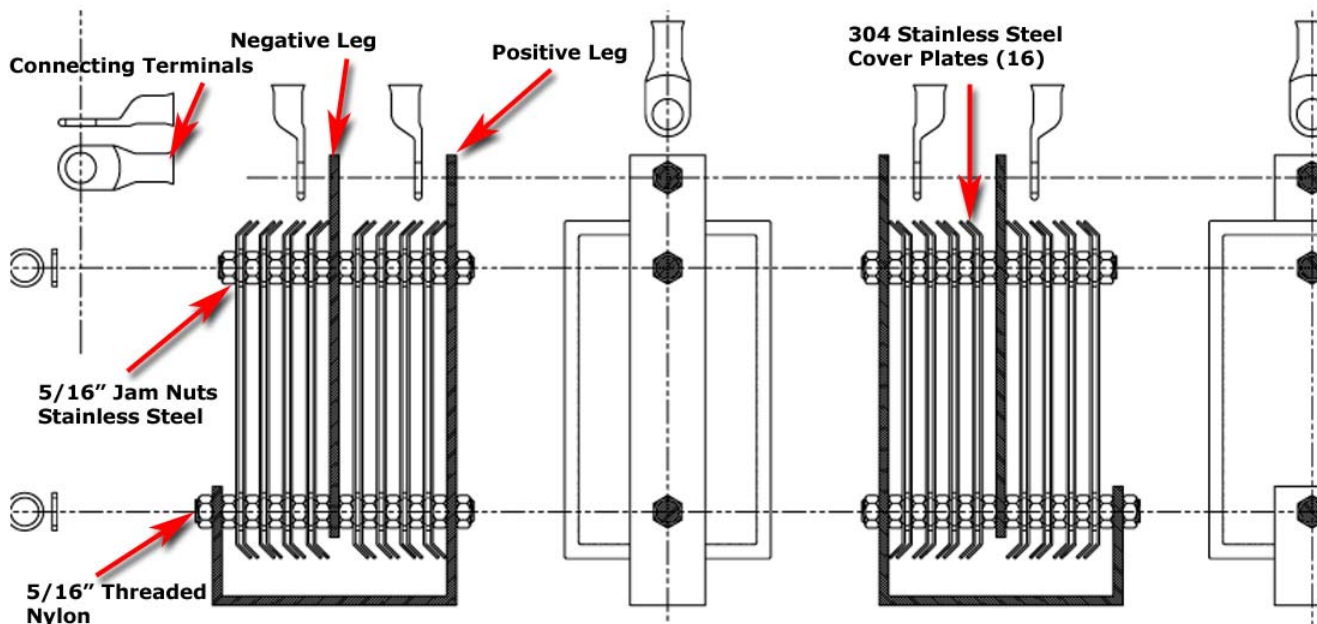
Keep your water distilled, and use quality electrolyte like KOH or NaOH, NOT baking soda, and your water will stay pretty clean and plates will last a long time.

Be Sure to check out the FREE additional books I’ve included with this manual. One discusses all the different experimental designs that are currently being worked on, and which show the most promise! I discuss the advantages and disadvantages of each one and what breakthroughs to expect in the coming years!

So let’s look at some CAD drawings on the next page that a friend put together for me (Special Thanks to John Patterson!)



Here is another illustration to help you understand the assembly details of this particular arrangement of steel plates. I will explain little later on (to those interested) why this configuration works so well.



The Plate Stack Assembly - 4 Views

This gives you a view of all 4 sides and components that make up the stack.

I am currently working on a few different variations of this that seem to be even more efficient – I will update all those who purchased this book on the progress and findings...

In case you're wondering why I recommend these plates – it's because they are WIDELY available to just about anyone, anywhere, but if you can't find them [we have some here.](#)

My current Power Cell using this design, PUTS out 2 to 2.5 LITERS Per Minute! It was doing 3 LPM, but I backed it down because of the extra load on my alternator.

That's as good as a single unit puts out, without going to multiple cell configuration (much more expensive-more time to build, and more complicated), or a large dry cell.

Take the time to build it right- you will be happy with the results!

I use this design because **it's EASY and QUICK** to put together. I wish I could claim it as my own, but I didn't create it. As I said earlier in my book, **the goal of all my research and testing was to siphon through the nonsense and BS and find what actually works.**

This is by far the easiest and best design for anyone to make QUICKLY and CHEAPLY and get into their cars to start saving gas money. It is referred to widely as the "Smack Booster". It is a brilliantly simple and efficient design. **AND it WORKS!**

I will say that, though the design is in public domain most people would never know where to find it, you have to know where to look, like a treasure hunter. That's where my role as a researcher comes in – to save you time and money.

The 16 Plates



As you can see above, this design uses 16 plates. They are very simply just Stainless Steel Electrical Cover Plates that you can buy at either Home Depot or Lowes for about \$1.25 to \$1.60 each.

They are cheaper than having SS plates cut out for you by a manufacturer, and are perfect size, consistently FLAT which is important for spacing, and you can get them TODAY.



CAUTION! Be careful at Home Depot! I bought a set of plates that the clerk assured me were Stainless Steel – cost \$1.07 each. Then I Prepped, cleaned, and assembled them. When I immersed them into my experimental unit (clear acrylic for testing) with a solution of KOH used for other design tests, they suddenly began bubbling like crazy! That would have been great, except they weren't connected to the battery yet! YIKES!

They got HOT and I couldn't stop the chemical process from happening. I had to carefully carry it outside and dump it onto a dirt pile before everything melted down. The plates were ruined and a brown sludge about ¼" thick covered the bottom of my container. Looks like the clerk sold me aluminum or stainless coated aluminum. I had to completely start over...



Here's what Home Depot sold me... The one on the right is that one after 5 minutes in KOH solution. I think it was brushed aluminum looking back, even though he looked it up on the computer and guaranteed me they were stainless! You WILL notice that stainless plates are noticeably heavier than all others.

Usually the true Stainless Steel Plates will say on the box that they are displayed in or they could be individually labeled, like the one above.



Here's a photo of the 2 different brands. Lowe's on the left, Home Depot on the right. I did this because I don't want you to think you can intermingle the two – their profiles don't match up. They will touch each other if you overlap them, so make sure you get 16 of the **same manufacturer/brand!**

I personally like the plates at Lowe's better than Home Depot, but they are not as available in as many markets. They sell a great Cover Plate by Carter and are individually wrapped and certified as 304 Stainless Steel (look for label on back). You Definitely want to use Stainless Steel – **Do NOT use Aluminum, Galvanized, Welding Steel or any other plate material** or you will quickly have a yucky sludge to deal with – and they will corrode and need replacing quickly.

Stainless Steel is like the energizer bunny- keeps going and going....and no sludge- just clean beautiful HHO gas to save you money and help the environment, as long as you use distilled water.

There are 2 kinds of Stainless readily available and used today – 304 and 316. There are actually many more grades than that, but these two are the most common. 304 is a little lower quality, but works well for the price. It has a little more iron in it I believe, which can start producing As far as I've been able to tell, 316 is not used in cover plates, so you will have to order it online and pay shipping/cutting costs, or if you live in a larger city, pay a local manufacturer to make you some.

The design we are working with uses the 304 and I have been using mine for some time now and they still look beautiful whenever I do a tear down to inspect or revise something.

"I like this design for efficiency, speed, and cost..."

For this particular design to work well, you will need to buy a 5/16"- 18 threaded nylon rod, stainless steel Jam nuts (which are regular nuts but much thinner- by almost half), and nylon washers. You can get all three at www.Graingers.com if you have a business or know someone that owns a business (Grainger's won't sell to the public – business to business only) or go into to their local store. We may opt to sell these, though presently we stock just what we use in our kits. If you have trouble finding some, let us know...

McMaster Carr sells them also. I've included part numbers for both in your shopping list file included with this book- just print it out and take it with you.

Once you have these, cut the nylon rod (I usually by 2'-4' at a time) into 2 – 3-5/8" lengths. This will be just the right size to fit within the 4" ABS pipe container.



HINT: BEFORE you cut the threaded nylon, use this trick: Screw a couple of nuts onto the nylon- one to about 6", one about 2". Then after you cut the 2 pieces you will have a nut on each. Now carefully unscrew the nut off each end. When you get to the cut, go back and forth a couple of times before completely removing it to "reshape" the threads from cutting. Use a sharp xacto blade or razor to clean up any edges that prevent nuts from being screwed on. We have also found that taking a well used grinding disc to the end (to square it off) works well. Then very lightly rotate the end against the spinning disc to soften the edges of the cut threads.

Next, screw a SS jam nut onto each rod, ½" from the end. This leaves room to attach the electrical straps and an extra nut, later. Set those aside and let's get the plates ready...

PREPPING THE PLATES...

FIRST- open all packets and remove gaskets screws, etc. You won't need them. Also, remove the sticky label on the inside (if it's from Lowe's). If you have trouble getting the residue off, pour a little denatured alcohol into a plastic container and soak the plates for a few minutes – the gummy stuff will come right off. **Do NOT use paint thinner.** It will leave an oily residue that can affect the production rate of your plates.

Denatured Alcohol can be bought at the hardware store in small quart or pint sized cans and it evaporates cleanly and quickly. I recommend using this after you have sanded and prepped the plates as well, so they are clean and perfect; just pick up a small can.



Next, take a 5/16" drill bit and ream out the 2 holes that are already in the plates. This is for the nylon rods.

Drill from the front, one at a time or the bit will overheat quickly. Use a piece of scrap wood to support it and drill into.

If you have a little Dremel tool or grinder, grind down the back side edge after drilling to make sure you have a smooth surface with consistent spacing.



If you leave a burr or raised edge, your plates will be unevenly spaced, and spacing is essential in this design. Make sure BOTH sides of holes are smooth!

Use a file if you don't have a Dremel, but I'd pick up a used one on Craigslist or Ebay if I were you – it's an invaluable tool in a build like this....

THE SECRET IS IN THE PLATE PREP!

Now, let me emphasize the **importance of the next couple of steps!** This will **DRAMATICALLY** improve your production of HHO gas in the Power Cell. Take a moment and watch the video I made of the way water cascades down an un-prepped plate vs. the prepped plate. (MEMBERS ONLY - VIDEO SECTION)

As you can see, the same volume of water, same flow rate, same angle. On the un-prepped plate it hits and flows straight down, barely covering a fourth or third of the plate. This is due to what's

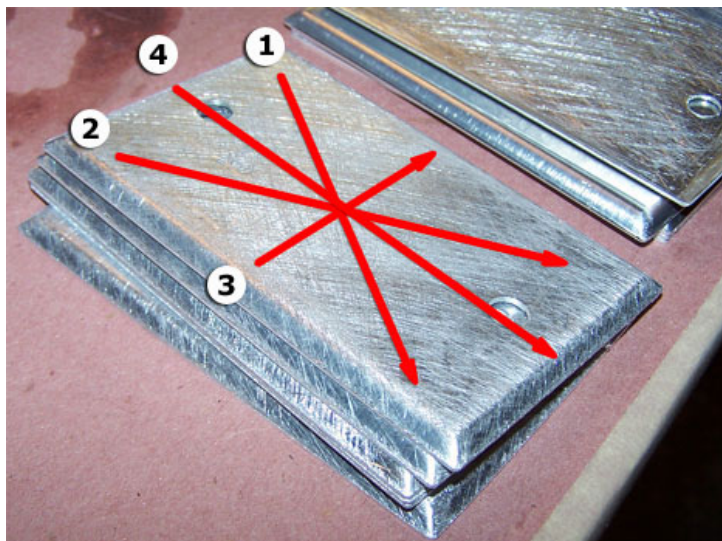
called the coanda effect. Water actually has a surface tension that “glues” it to smooth surfaces, and it will follow the path of least resistance.

Now, take the prepped plate and watch what happens. All the micro-grooves create turbulence and miniature pathways for the water to follow, resulting in almost 100% coverage of the plate.

The gas will do the same thing. As HHO is formed, it creates little gas bubbles that vibrate up the plates and break loose to float up and out of the water. The surface tension of the water will try to make these bubbles stick, reducing gas production. By prepping the surface, you create less area for these miniature bubbles to hold onto and they release much quicker and more frequently- i.e. More HHO Gas!

Again, this is not new to the experienced builders- it’s tried and tested method developed by Bob Boyce of Florida, who has some tremendous successes in HHO- even running a motor on pure water (more on that later!).

I went a step further with mine – think it results in better flow. Bob recommends using 36 grit paper (so do I). He recommends cutting one way and then 90 to that. I cut 45 to the vertical of the plate, then 90 to that. Then I cut straight across horizontal and finish up with a good vertical cut. This really creates some great pathways for that gas and is what I use on my 2.5 liter a minute Power Cell. It is also the plate I used for demonstration with the water- the results speak for themselves.



Also, do NOT neglect to sand the rolled or stamped edges of the electrical plates when sanding with the 36 grit paper.

You want to provide a good path all the way off the plate- otherwise the bubbles will stop and gather at the edge.

And DON'T power sand is my recommendation. A power sander oscillates and creates circles, you want straight pathways to the edges.

Get the sheets of 36 grit and hand sand – you want the grooves there, but not so fine they don’t work (that’s my opinion based on building and testing). If you insist on power, use a belt sander – at least the lines are straight that way. But they won’t work on the backside of the plates and you have to sand half of those.

So stick to hand sanding. It’s a little labor intensive, but sit down with a board and your plates and do it while watching TV if you have to.

JUST DO IT! It will make the difference between an OK Power Cell and a **Fantastically performing Power Cell**. And please, don’t come crying to me that it doesn’t work as well as mine does, if you don’t do all the steps I show you.

Perform this sanding plate prep as follows:

- 1) On 8 of the sixteen plates – do outside (including edges!)
- 2) On the other 8- do the inside (including edges!)
- 3) On 2 of the 16 – do both sides (including edges!)

It's harder and more clumsy to do the inside of the plates – but critical if you want it to work at peak efficiency!



You can see the effect of scratching/etching the plates on the photo to the left.

By the way if you think the photo is crooked, it's an optical illusion! I "straightened" it 3 times and it still looks crooked.

Scroll it up or down to line it up with your computer screen to verify – cool...

Once all plates are sanded, you need to clean them thoroughly. Some guys say it's not good to introduce other chemicals onto the plates and just suggest water/soap. I personally find that a quart plastic container (from Ace or a paint supply store) filled with denatured alcohol works great because it does 2 things. It softens and makes easier to remove any gummed label from inside plate, and it removes all evidence of grease and body oils from handling the plates, as well as sandpaper and metal particles or residue.

Soak them for awhile and pull them out one at a time-placing them onto a clean paper towel. Use another one to blot or wipe clean and let them dry a few minutes.

Now, here's where I recommend you using some latex or rubber gloves. Buy a few pairs of disposables and put them on before handling SS prepped plates so they don't get contaminated. Greasy fingers will cut down HHO production on the plate areas you touch....

If you have ever installed a Halogen light bulb, you know the effects of the oil on your fingertips. If you don't wear gloves, the slightest bit of oil (you know – where the CSI can find fingerprints?) will focus the heat from the Halogen bulb and it will burn out very quickly.

Well it can have the same effect (in reverse) on the stainless plates. Wherever you touch you leave a fingerprint. The oil can cause the HHO gas to form around the print, but you've just lost an effective part of your plate. Pick up and set down the plate 10 times andwell you get the picture.

Magnetically Aligning Your Plates

This next step is not used by everyone, but I use it because an industry pro uses it, so I respect that. Learn from those that do... I did **And I am getting 2.5 Liters Every Minute- from my HHO generator!**

First, let's sort them and stack them in the order they will be assembled.

Start with one of the 2 plates etched on both sides. Have the outside of the plate facing left and put a small number 1 on upper left hand corner.

Now take the second plate which should have etching on outside and number it 2.

The third plate will have etching on inside – label it 3.

Next one will have etching on outside – 4;

And so on until all 16 plates are labeled in the same corner, stacked with etched sides facing each other and the shiny sides facing each other.

The last one should be the other plate etched on both sides.

It also helps to mark this last plate with 16 on the outside so if you get distracted, you can hold up the pile of plates and see the number to make sure they stay aligned. Make sure you put all the numbers in the same corner (like upper right hand), so it's easy to keep them in order during assembly.

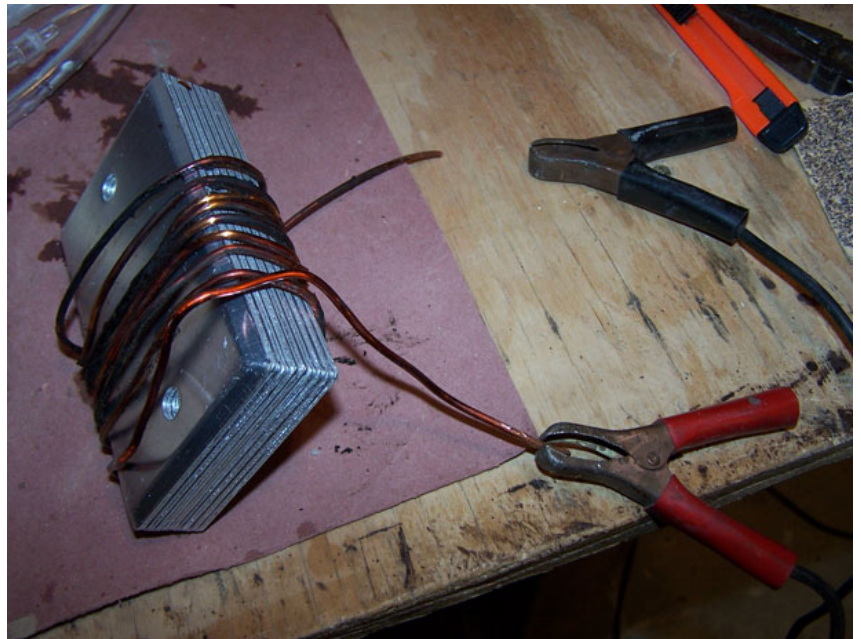
Once, presorted and stacked (again Bob Boyce!) suggests wrapping a coil of wire around the plates (before assembly) and “pulsing” current through it to help magnetically orient the plates.

I use just regular solid core 14 gauge wire from the hardware store or Home Depot. I use a standard solid core with insulation.

This picture below was my first attempt using magnet wire from an old transformer. You can see the clips of the battery charger. Just “Pulse it” until it gets hot.

Bob does not go into any detail about the length of the coil or how many turns around the plate stack so I arbitrarily came up with a simple formula:

I wrap one coil around the whole stack for each plate, so 16 plates = 16 times around. Center it in the middle of plates and wrap as evenly and as tightly as you can, not overlapping the wires (The picture above does not show what I use now, which is the 14 gauge solid).



This is why it's important that you use insulated wire NOT bare ground wire. Bare Wire + Battery current + Metal Plates = Disaster. SO be smart. It's better if you leave an extra 18" to 2' on both ends of the coil, so that you can safely set it on a wooden bench or insulation while you energize it.

Cut off insulation from the last inch on each end of the coil.

Now this is a little tricky which is why I suggest you set the coil down and not try to hold it while pulsing. You don't want it slipping out of your hands on top of the battery. Arcs and Sparks are

great for Tesla Coils and Welders. All others need not apply – be careful! Remember, I am not liable for stupid. Be smart and this will help you....

Now you can either hold one end of the coil to a battery post or if you have a clamp use it if it's easier for you **(just connect ONE SIDE ONLY!)** If you connect both sides with a clamp you will get a quick lesson on resistance and HEAT! The battery will send all 85 amps or more through that wire and your insulation will get so hot you won't be able to touch it. It will melt before you can disconnect it or cut it. The wire will be ruined, your battery could get hot and explode, all the work you've done on your plates will be wasted because the insulation will melt down and ruin them.

You get the picture? It's perfectly safe if you are smart. So don't be stupid – be smart and everyone wins....

Assuming you have connected one end of the coil top say, the negative side of a battery, take the other end of the coil and "Tap" the bare end to the positive side of the battery. Remember! Do NOT just leave the ends connected to the battery or you will have a beautiful SS heater- for about 2 minutes, which will be a melted mess of insulation and burnt wiring afterwards.

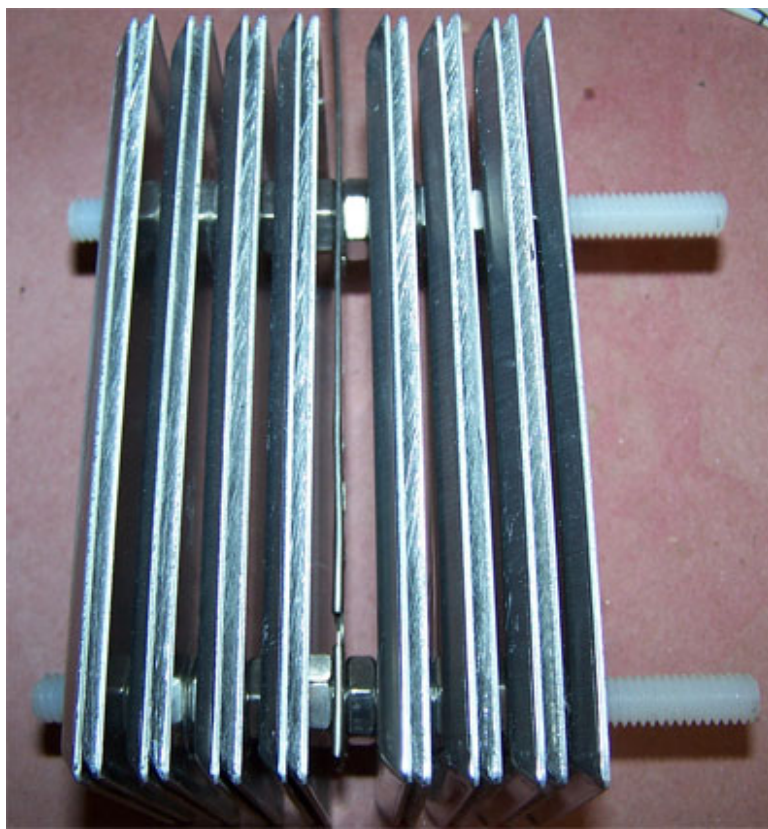
When I say Tap it, that means touch and quickly release. Don't hold it there even for a second or the coil will heat up before you can properly orient it.

Just tap it a dozen or so times, keep checking the plate stack and you'll start to feel the coil heating up at the end. Don't get it too hot. Let it cool for a minute or two and then remove the coil.

Now if you want the benefit from orienting the plates magnetically like this- you must keep them in the same order, direction and orientation. That's why I recommended pre-stacking and marking them in the order they would be assembled in....

Alright! If you made it this far you are ready for the fun part – let's put this baby together, oh and one more thing... Where are your gloves?

Assembly of the Plate Stack...



Take the 2 nylon rods and thread a jam nut onto each one at one end no more than ½". Slip the first cover over them both with curved edge to the right as in picture and illustration. This first plate should be one of the 2 **that was etched on both sides**. The first nut on top and bottom should rest against the plate and there should be ½" from the base of the nut where it meets the plate to the end of the nylon rod extending to the left.

Now slip 2 nylon washers over each rod and push smooth to the surface. Take plate #2 (etched on outside of cover) and slip it over rods until it touches the washers. Now Gently screw one Stainless Steel (SS) Jam nut on each threaded rod as shown until they contact the plate #2, and lightly snug them up with a half inch box wrench. Don't over-

tighten – you could strip the thread. Just tighten snug enough to hold plate firmly against washers. It should look like this...

Put plate #3 on (etched surface facing to the right) until it touches the nuts, slip 2 more nylon washers on each end, then plate #4, then the jam nuts. Continue until first 8 plates are done like this, forming 4 “cells” of 2 plates each.

Remember to keep them in the order you had them when you “magnetically oriented” them.

Once you reach the middle and have secured the half stack with jam nuts, it’s time to make at least the middle electrode, but you might as well make both. I know the connection seems strange even if you have electrical background. I know it did to me the first time I saw it and I’ve wired homes and commercial sites. I have a pretty darn good understanding of electrical theory, but it still took me a few minutes to grasp this arrangement. I’ll explain more about that and why it works in a few minutes. For now, let’s concentrate on the connectors.

You obviously want to have a good size conductor to carry 20-30 amps from your battery into the plate stack, which will be immersed in electrolytic solution. Some choose heavily insulated wire and crimp on fittings going from the plate stack to top of the Power Cell.

That works well, but just be aware that ANY exposed metal not made of stainless steel WILL corrode in the gaseous caustic soda environment. The crimp on fittings are usually copper or aluminum, and they could react with the KOH in the solution. In my latest version I use copper terminals, but I paint them with a couple coats of liquid tape, then wrap them in electrical tape stretched tightly, then put heat shrink over them. That seems to work well...

My objective is to help you build the most reliable piece of equipment for least amount of money, and still get a decent, long lasting Power Cell at the end. So if you use the copper protect it well, otherwise stainless connectors seem to be the best. So where do we find these locally?

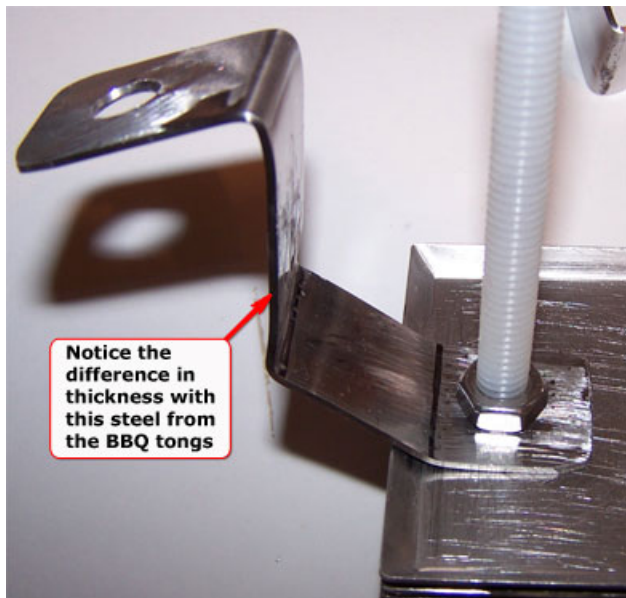
The original design uses a couple of long Stainless Steel Spoons – the large ones like what are used for outdoors or big salads. I found a \$6.00 set of tongs from Ace Hardware in the BBQ area, not the ones in the kitchen accessories area which are significantly thinner metal.

These work great, and are cheap. The stainless Spoons are longer and thicker but cost more.



If you go with the tongs, get the longest set you can find. Drill and Grind off the little rivets holding the handles to the stainless steel pieces together and punch them out with a small nail or punch.

You should now have a long single piece of thick stainless steel strap that you can cut and bend to the desired shape.



(This was a strap for a different design but I wanted you to see the thickness compared to the old strap above).

Cut one strap about 7"-8" as shown. Place it on the ends of the nylon rods and use a marker (Sharpies work great!) to trace around them. Drill the two holes with a 5/16" They should look like this when done:
Now you can take one of these and line it up over both nylon studs and mark where the holes need to be.

Drill 2 - 5/16" holes and test fit – it needs to slip all the way to the nuts on the half stack. Don't bolt it on yet. Take the shrink tubing (from Home Depot) and slip over the connector, covering anything that extends up beyond the stack and just a 1/4" or so below the stack. Use a heat gun or flame (Careful not to burn through it!) to shrink to handle size.

We do this so that no current can pass between the two electrodes coming down into the plate stack. You want all current focused down on those plates! Leave the part that connects to both nylon rods uncovered, as this is the neutral leg anyway.

Now slip the negative electrode onto the rods and tighten with 2 more jam nuts as shown.

Now you can take the next plate in line "9" and slip it over, then washers and so forth until all 16 plates are connected. It should look like this.

Once that is done, take the second electrode and bend it/drill it as illustrated. This electrically connects the two outer sets of plates making them positives. Once the electrode is measured/ bent/
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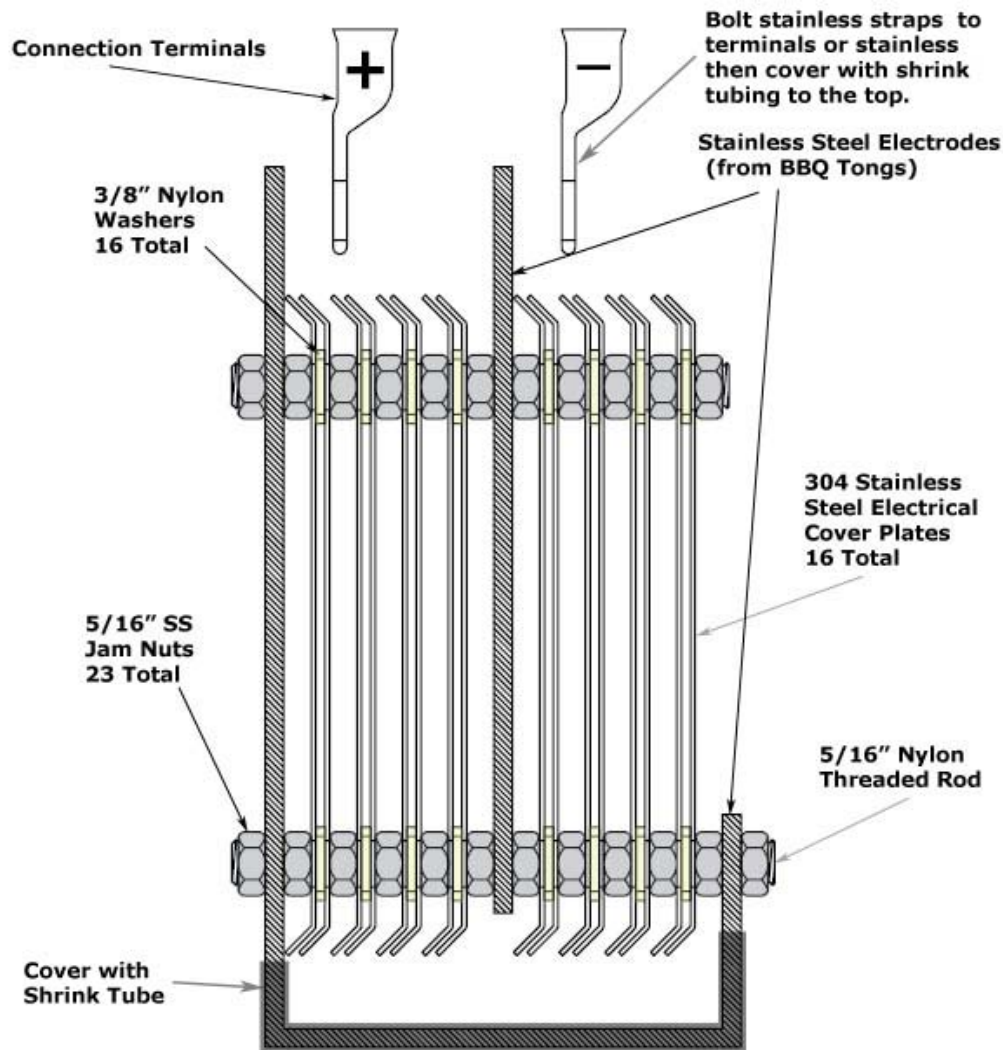
and holes drilled, do a test fit to make sure it all works. Then remove it and slightly straighten the one end so you can slip on the shrink tubing as shown. It doesn't slip around bends very well, so if you straighten it, it makes it easier. Apply heat and shrink that one as well.

When you are done, it should look like the picture below. It is straightforward and simple. There are differing thoughts on connectors, most suggest connecting to stainless straps, which certainly helps against corrosion, but doesn't guarantee it. Most stainless tongs seem to be made of 304 stainless, so there does seem to be a little iron build-up on surfaces anyway.

I've actually had good luck in prepping this way:

- Paint 2 coats on all exposed part of terminals using liquid tape (HD)
- While second coat is tacky, wrap with electrical tape (Really stretch it)
- Slip over shrink tubing – melt into place

This has almost eliminated corrosion problems – at least dramatically...



Finish the plate assembly by connecting this last electrode as shown- tighten bolts and put it aside (cover it if your work area is dirty or dusty – or put it into a large size Ziploc baggy).

We MAY be assembling some of these and offering them in the kits; Depends on interest – [check here to see.](#)

Why Does This Design Work?

If you would like to know why this design actually works read this next section. If you aren't interested, feel free to jump ahead- there won't be any final exams on this. For the rest of you that are curious and interested enough to want to understand it, have fun!

The **working space** in an electrolyzer is the **space between plates**. If you have a positive and a negative plate, the gas forms in between the two. This is easy to do, but certainly wouldn't make much gas (remember battery in water?).

Anything over 1.25 volts (realistically about 2 with losses) per cell is wasted energy and turns into heat. SO if you put 12 volts into 2 plates – the heat would be tremendous, but only the first 2 volts would actually be making HHO gas. The rest is wasted.

Ideally, keeping the voltage between 2 or 3 volts max between plates is the best practice. It gives a good balance of voltage and HHO Gas production.

So you want to stick as close to that general rule as you can for roughly the 12-13 volts available from the battery. Let's look at half of this stack:

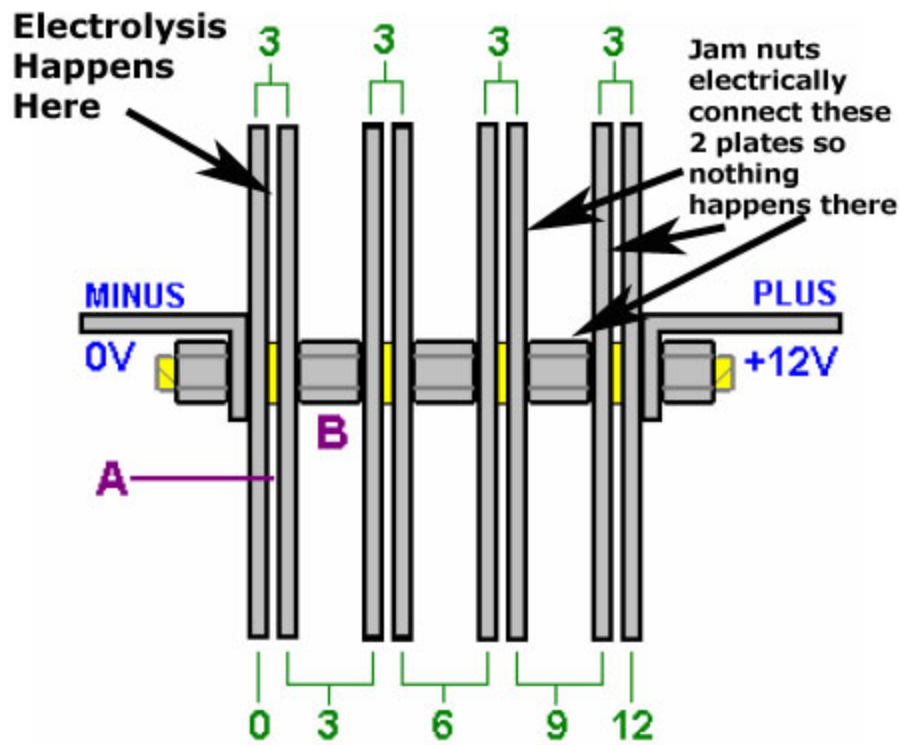
This configuration is called a series connection. It is somewhat similar to taking 4 resistors and connecting them end to end. The voltage drops evenly through each one until exits the end. But instead of resistors, you're using water and calculated spacing.

All electrolysis happens between the each of the close spaced plates (in between the etched sides spaced with nylon washers). Since there are four sets of 2, there is approximately 3 volts per set of two (12 volts divided by 4). That's easy enough.

But electrolysis only happens between a + and a -, how does that work here?

Let's look at the set of 4 pairs again. This is a drawing Patrick Kelly uses to describe the process- I've added a few notes to help clarify.

Electrolysis happens at the place of least resistance – hence the close plates. Starting at the outside plate, we have 12 + volts.



VOLTAGE DROPS FOR A 12-VOLT SUPPLY

When we drop 3 volts across the first gap we know have 9 volts at the second plate. Since the second and third plates are connected with the metal jam nut, the second and third plates share the same voltage- no drop across a gap - does that make sense so far?

Since the voltage only drops through a resistor (water), it only drops in voltage where the insulated gaps are (using nylon washers) being forced to travel through the water/electrolyte to the next plate.

So now we are at the 3rd plate which is now 9 volts electrically. It must now travel through the second "water resistor" to the 4th plate, so it drops another 3 volts across this gap to make it now 6 volts. It is electrically connected to the 5th plate which is the same voltage of 6 volts.

The voltage now travels through the third gap between plates 5 and 6, dropping another 3 volts then finally makes it to the neutral leg in the middle dropping the final 3 volts.

So a voltage will drop evenly through a group of resistors when wired in series. That's what makes this design so efficient. And though voltage drops, the current remains steady throughout the series.

It's really quite elegant and a perfect solution for a "Brute Force" Electrolyzer such as this. Kudos to the Smack Booster designed by Dustin of Arizona.

If you have trouble getting your mind around it, Dustin explains it like this (with a few added comments from me:

"If I am standing at the bottom of a hill, and my friend is 10' above me he is positive or higher than me".

Let's look at it as water being the electricity. If the friend has a 12 gallon tank of water and a tube connects us, because he is 10' higher than me, the water will flow down to me.

"If we climb 100' up the hill, staying the same distance apart, my friend is 110' up the hill, but he is still 10' higher than me".

So water will still flow downhill to me because he is in a more positive (or higher) relation to me.

"If we both climb another hundred feet, he is still in a more positive relation to me because he is still 10' higher than I am." So let's apply that to these plates:

Lets say our friend, Volta has a container of water and we are 12' off the ground. I have an empty container and there is a tube connecting us and we stand on even ground.

Now I climb downhill 3 feet- Volta's water flows to me because he has higher potential than me. Volta climbs down to me and now we're both at 9'. I now climb down another 3' and water flows down at the same rate as before, because Volta is still 3' higher potentially than me.

Does that help to clarify Why this design works so well? Don't feel bad if you have trouble understanding, it's not easy at first to wrap your brain around. But once you get, you get it. And future designs and tests are easier to play with when you understand the concept.

I hope I've helped you do that.

Alright, class dismissed. Let's get back to the fun stuff!

The Container

The Power Cell plate assembly is by far the most critical thing requiring close attention to detail. Its performance hinges on it.

If you wanted, you could right now, immerse it into a bucket of water with KOH in it, clamp a 12 volt battery charger to it and watch it Come Alive!

Go Ahead- I dare you not to fire this thing up.

It's like turning over a newly rebuilt engine for the first time. Except it doesn't take as long and it's not nearly as expensive. Oh yeah, it's practically silent too.

I'm telling you though, it is an awesome thing to fire this baby up and see the HHO gas POURING off those plates. It's almost hard to believe **how simple it is** and how easily you can be making your own clean, alternative energy out of water! If you don't get excited about it, you must be half dead. I was seriously shouting and hootin' and hollerin' the first time I saw how much gas was coming out of water!



REWARD yourself, take five and do it if you haven't yet. It'll really motivate you to get this baby finished. Just don't run it too long just a few minutes at max – you don't have a bubbler made and you don't want the HHO gas to accumulate for too long. A spark could set it off, and that would end a perfectly fun day.

If you want to run it before the container is made- take it outside. Hydrogen has the distinction of being the fastest dissipating gas – ever. Literally seconds after you turn off the Power Cell, the gas is gone.

OK. Did you get that out of your system? No? Oh well, too late. Let's get back to work!



Here are the 4 pieces needed to quickly put together this container. I put the one above together in 30 minutes.

Are there better stronger, more professional containers you can use? Sure! But can they be put together as quickly? No Way!

Bottom Line: These parts are easy to find, cheap, and Quick to assemble.

We will offer these, pre-cut [in our kits](#),

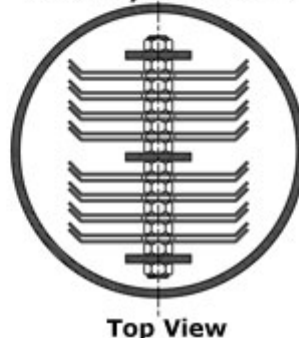
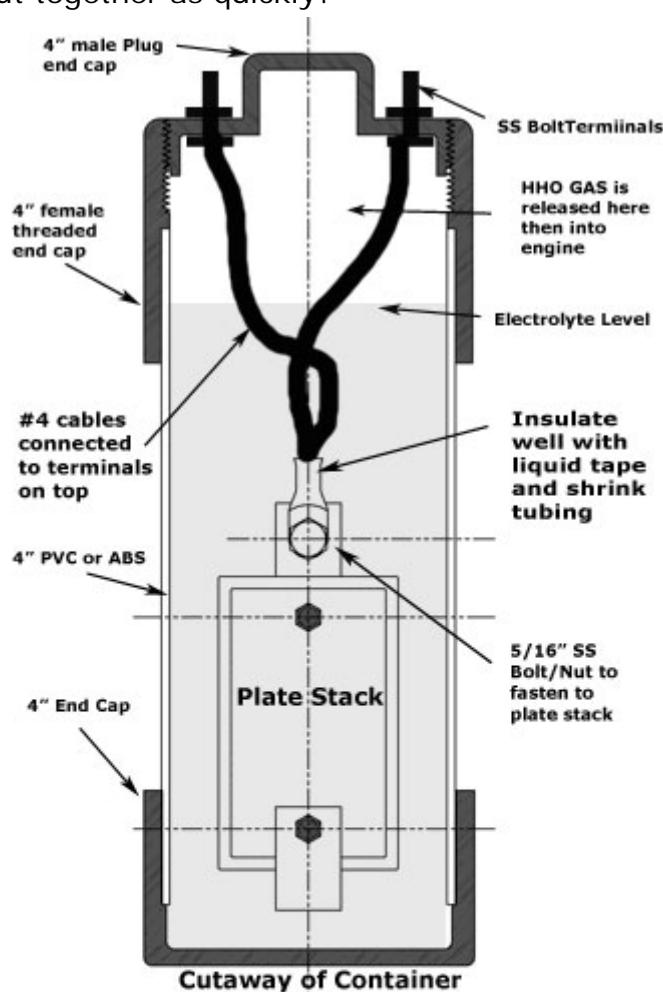
if you're interested.

The Container Construction

While it is critical to construct the Power Cell Plate Stack with some precision and attention to detail, the container becomes just **a means to an end**. I'm using the design of Dustin's because it's efficient, compact, and it works. And it's pretty darn cheap to make as well.

Here's a Cutaway drawing of this basic setup. You could substitute Stainless straps for cables- just cover with shrink wrap up to top of cap (as close as possible).

You could make it out of whatever you want, as long as it can take the heat (higher current models can get quite warm while operating, and some plastics could melt under that environment- especially thinner plastics).



Don't use Tupperware type containers, they'll soften up and could melt. You don't want electrolyte leaking all over your driveway or garage floor...

Thick acrylic works well, but must be cut precisely and glued with the acrylic cement. If you use this, make sure you use a fine sandpaper to remove all saw cuts on edges so there will be no gaps for water to leak out. Or you can glue it together with "Goop" Marine. Just let it set up at least overnight, sometimes longer if it's cold outside.

WHERE Will You Put It?

The big decision making criteria in constructing the container is going to be determining how much



room you have in your car, van, or truck? For this size Power Cell, you don't want to put it into the trunk; it needs to be close- as close as possible to the air intake of your engine. You certainly don't want 15' of hose from trunk to front filled with an explosive gas like HHO!

We get into more detail in **"THE INSTALLATION"** Chapter, but you **DO** need to decide where you will put it so you can determine the size and type of container you need to make.

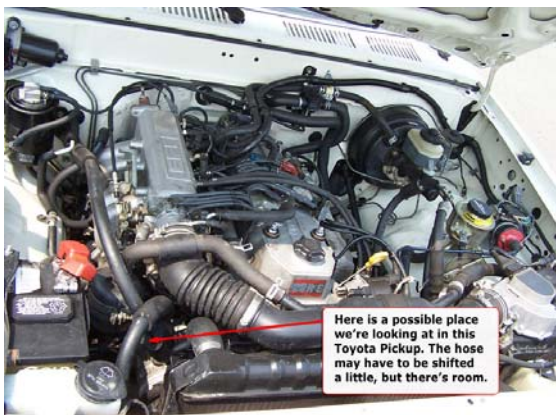
If you run into a space problem, you CAN shorten the length of the tube, but you will have to either

check your water more frequently OR make an exterior reservoir that keeps it filled automatically.

Most guys are putting it into the space between the radiator and the front grill of their car- there is usually plenty of room there. If you have an older car or truck, you usually have so much space you can practically climb into the engine bay (sigh- I miss those days before every spare inch was crammed full of C----).

If you have a more modern car, or a full size work van like I do, you will have to fit into the engine compartment, because there is not enough room between grill and radiator.

Scope it out before you get too far into the container build. Make sure what you build is going to fit, so you don't get frustrated and waste time.



This is why I like the simplicity of this container. It's constructed of 4" PVC or the black ABS like you can get at Home Depot or Lowe's, or any home improvement place. In fact, Home Depot now carries pre-cut sections of the tubing, so you can buy 2' instead of a 10' section! Cool.

Use the shopping list and pick up the recommended pieces. I like the black ABS better because the end cap is much flatter. Since it's the bottom of the Power Cell, it sits more stable than the white PVC end cap which can be quite rounded.

The total height of the thing is going to be 14 to 17 inches depending on how long you cut the main tube. By the time you add the outlet valve, and recommended safety pop-off valve, it can quickly reach that 17 inch mark. So take that into account when planning the length. 11 – 12 inches long for the tubing is quite sufficient.

If you measure every inch or so, it too anal about it by the caps that

Once you have it edges. It will PVC glue if that's bottom inch or so end cap. Quickly you're pressing to seat the cap all

Do the same with overnight. It



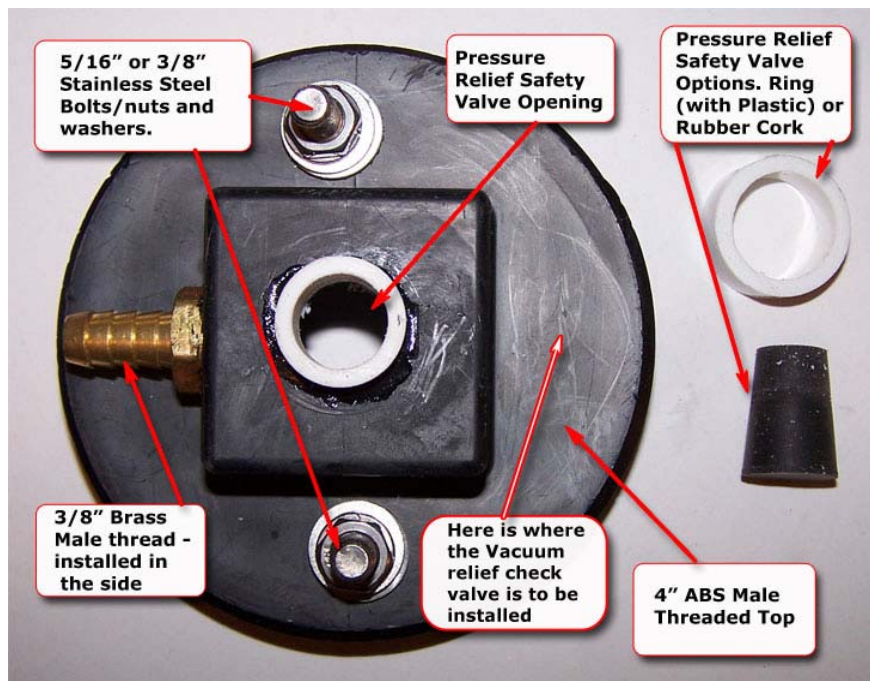
and mark with a Sharpie all the way around about will help you to get a clean straight cut. Don't be though – you won't see the cuts – they'll be hidden get glued on.

cut, take a piece of sandpaper and smooth the make the cap fit on easier. Now using ABS glue (or what you're using), quickly apply liberally around of the pipe and immediately to the inside lip of the press them together and give about a ¼ turn as the cap on to insure perfect fit. You should be able the way to the bottom.

the threaded top piece. Set it aside to cure should look like this:

The CAP

If you pull out your previously constructed Plate Stack, You will see that you can slip it right inside the threaded opening of the Power Cell; should just clear everything. If it does, congratulations! If it doesn't, what directions were you reading from? These may come [pre-assembled in our kits.](#)

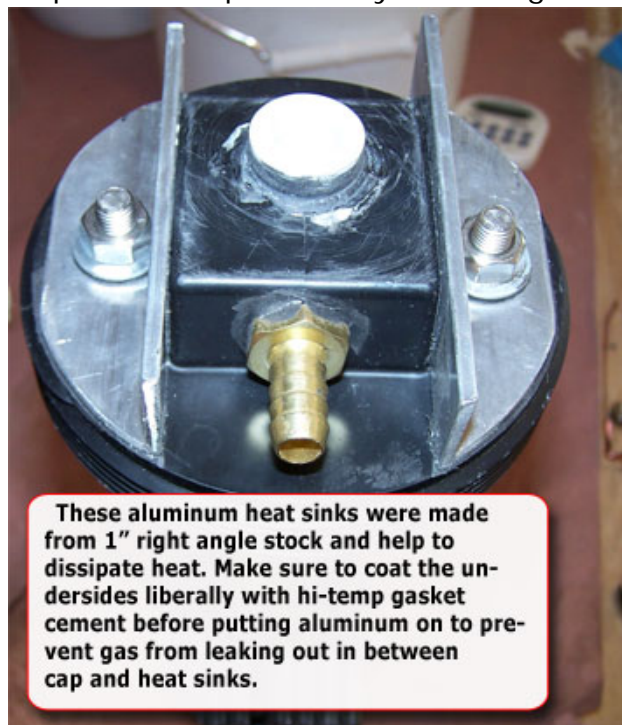


Assuming everything fits as it should, the straight tabs coming off your plate stack will be connected to the underside of the cap. They will need extensions which you can make from another set of tongs or spare pieces left over – just bolt it to the other straps nice and tight.

An alternative is just use copper wire connectors up to the cap from this point. They won't degrade as quickly because they won't be immersed in electrolyte solution – they'll be above it in the HHO gas. However you choose to do it, cover connections with more shrink tubing to insulate and protect. I like to paint a couple coats of liquid tape over all exposed terminals – seems to cut down corrosion well.

Drill 2 holes in the top of the cap on opposite sides as shown. Make sure they are out far enough from the square protrusion so that you can get washers and nuts to sit flat. Too close and you won't be able to use the neoprene/steel washers which are used to keep gases from escaping around the bolt holes (Just a guess, but you probably DON'T want HHO gas escaping out into the engine compartment of your car)

In one of my builds, I went a step further here, only because I generate some pretty good current in my Power Cell, and sometimes the ABS can soften up a little around the bolts because of the way they heat up.



I picked up some 1/8" thick right angle aluminum from Home Depot. I laid the lid on it and traced around it, then cut it using my saber saw and a metal cutting blade. I filed edges smooth and positioned them in place on the lid. Only THEN did I drill the holes for the electrode connections. Afterwards, I secured them in place with a thick layer of High Heat Silicone Gasket Maker from the nearby Auto Store. I hand tightened bolts and nuts lightly (so as not to squeeze out too much gasket material) and let it set up overnight.

The aluminum works like a heat sink and distributes heat better than bolts by themselves, and the gasket cement keeps gas from leaking out from under the aluminum which you don't want.

Again, just make sure you drill the holes after positioning the angle stock, because holes will be off if you don't due to thickness of the metal.

You need to drill 3 more holes in the cap. One is for the safety pop off valve, the other is for the outlet valve. I like to drill for the outlet as shown – in the side of the square. The top is perfect for the pop off (more on that in a moment). The last one is for the vacuum relief valve.

TAPPING a THREAD into the Plastic

Now here's a really cool trick I learned while researching construction techniques for you. The threads on a piece of Nylon barbed fitting or on a brass barbed fitting are "Pipe Threads". That is, there is no "nut" that can screw onto them from the inside.

So you can't drill a large hole, then fasten it from inside. But you can't just buy a huge thread TAPPING tool either (Well maybe you can, but why? Remember- saving money putting this together is the object!)

So what is one to do? **Check out the video in our private members section** to see how easy it is!

Basically, whatever size thread you need to tap into the plastic, can EASILY be made with one of the brass fittings. Find one for a couple bucks at the hardware store with the same size as your nylon fitting (hey are the same thread size!). While you are there, make sure you have the right drill bits as well.



Use a bit that is smaller than the threads of your outlet valve. I think mine was 5/8" but you can use what you need to make it work. Just don't use a bit that's too big, because you won't have the ability to thread it into the plastic, providing a tighter fit and better mechanical seal.

Now, drill the hole(s) for the fittings. Get pipe or cap ready, close by.



Clamp the brass fitting firmly with a pair of vice grips (but not too tightly, as you don't want to crush or distort the fitting). Now use a propane torch on low and evenly heat up the fitting for a few minutes. Not too long here – we're tapping plastic not trying to braze metal!!

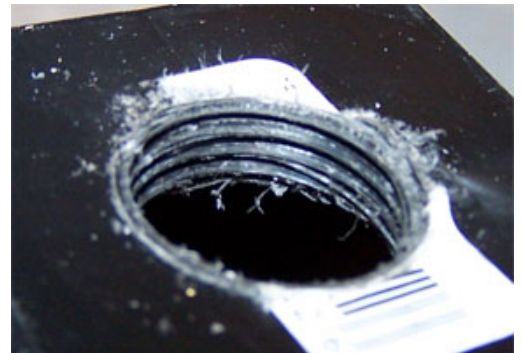
Once it's hot, **quickly** pick up the cap or tubing, and position the fitting **SQUARELY** in the opening. Now gently begin to tap the threads into the plastic. If the temperature was right, it will cut through the plastic like butter, without melting the surrounding areas! As it cools keep screwing and unscrewing it in the opening, so the fitting doesn't get stuck as the plastic solidifies.



Once it cools, you can remove it and the Nylon fitting will thread in perfectly! Use plumbers tape and install the fitting and check for leaks.

Here's a close up of the new threads formed into the plastic. Now you can insert a plastic or brass fitting with thread tape and have no leaks. I usually coat the threads with GOOP and screw in- let dry to insure no

gas leaks. But make sure you have it where you want it first.



The other option I have used is to really get the fitting hot, and screw it in quickly. When hotter, it will melt the plastic and you'll notice it getting very "mushy" around it. Be careful not to "push" the fitting through, just gently turn and push until the fitting is flush with surface. Now, just let the fitting cool-don't touch it.

The plastic melts and reforms perfectly around threads and glues it into place. You may not be able to get it out, but this method seals things up well!

You can also buy Pipe Thread Taps (NPT), but they cost \$20 and up and are sometimes hard to find.

The ABSOLUTELY NECESSARY, LIFE SAVING, INCREDIBLY COOL Pressure Relief VALVE

Now, let's talk about the safety Pop Off valve. This is a very recent development by seasoned users and experimenters of HHO Power Cells. There are inherent risks when dealing with explosive gases, that's a given. What we want to do is eliminate or greatly reduce whatever risks are there, so as to make this a positive, environmentally safe and people safe GAS SAVING DEVICE.

There are two things we want to do to be safe here...

1. Protect the Power Cell from any flame or fire that may get into the injection tube (highly unlikely – but best to be safe) by running through the bubbler before going out to the air intake of the engine.
2. Protect the Power Cell from explosion if by any small chance anything should get by the bubbler, or you have a short in the Power Cell

Why? Well, if you are just getting your feet wet with HHO, it's a blast; literally and figuratively.

HHO helps save you money by causing gas to burn faster and cleaner than without it. The bottom line is it packs a wallop! You'll see first hand if you follow my instructions and make a fun "Bottle Rocket Launcher". **(SEE LINK AT End of PART 1 or End of the Book)**

Make a bottle rocket launcher, if for no other reason than to witness and demonstrate the power of Hydrogen in the form of HHO gas. My Power Cell will fill an average size bottle (we drink Arrowhead, 700 ml) with HHO in less than 10 seconds. Ignite it and it will fly a hundred feet up. Fill it anymore than that and it will EXPLODE with a terrifically loud bang that will make your neighbors wonder who shot off a gun or an M-80!

CAUTION: WEAR EAR PLUGS! If you don't, and it explodes, your ears WILL ring for hours, not minutes. And you could lose your hearing (Again, You play at your own risk, I can't control stupid. Don't be stupid and you will have fun with this).

MY point is this: If a little bit of HHO in a plastic water bottle can do this, don't be naive thinking that it couldn't happen to a sealed Power Cell. Odds are it won't, but do you really want to take a chance, when you don't have to? Why lose all your hard work? Just take a few minutes and make this safety valve- you'll sleep better, and so will your loved ones.

There are 2 ways to do this: The most common is as shown, by gluing in a ½" piece of pipe into the cap, then taking an end cap of the same size and cutting off the "cap" part so you have essentially a "ring" that press fits over the short piece of pipe.



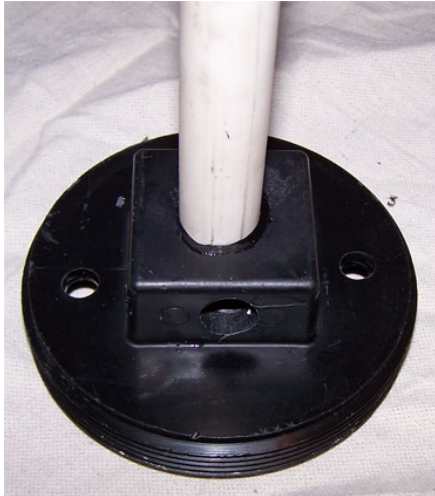
Then, cut a small piece of cellophane, like from a sandwich baggie (two layers is best), and place it over the pipe opening, clamping it down and holding it in place with the ring.

If there is an explosion (worst case scenario) inside the HHO generator, The plastic blows out and the Power Cell is unaffected.

The only thing that happens is the small amount of manufactured HHO gas is exploded. And you have to replace the plastic cellophane. Big deal. Small price to pay for such a great safety device!

(Here's a close up of that valve with the ring in place and a piece of sandwich

baggie stretched tight and held in place with the ring.



The easiest way to do this is drill a 13/16" hole in top. Test fit a 1/2" piece of PVC tube.

It will be snug, sand it a little if you have to – you want it tight.

Then apply black abs glue to cap hole and pvc tube- insert quickly and give a little twist.

Don't extend down into **inside** of cap more than 1/8" or 1/4". I find it's easier to leave the tube long until after glued into the

hole, and then cut it 1/2" from top after glue dries. I usually make the pressure relief valve first, then do all the other taps and attachments.



The Rubber Cork

The second way also works well. I still use the tube as above, then you can try either method. Just pick up a couple of Rubber corks from Ace Hardware. Push that baby in nice and tight – tether it to the case, so you don't lose it if it pops. It will pop out way before the case explodes.



Also makes a nice hole to refill Power Cell with distilled water!

Here's a photo with the cork in place (no tether yet). You can see the ring in the background that fits snugly around PVC tube.

By the way, do NOT use the natural corks. They have little nooks and crannies that could allow gas to escape into the engine compartment – a big NO-NO.

Use the black rubber ones and push them in securely- check them often to make sure they haven't come loose!

The RESULT of HAVING A Pressure Relief Valve?- No blown case. No spilled and spattered electrolyte (with caustic soda), no ruined plate stack. It makes it incredibly safer- **please** put one on yours, do NOT neglect this MOST important feature, and do NOT think that because it's simple, that it is not important- **it is THE single most important feature on ANY Water Fuel Power Cell!**

Alrighty then, I'll get off my soap box and return you to your regularly scheduled program....

The VACUUM RELIEF VALVE



The vacuum relief valve is also a very important piece, just as important as the PRV (Pressure Relief Valve), though not for safety reasons. When the engine is operating at high RPM's, there is a tremendous amount of vacuum created, way more than needed to draw the HHO Gas into it.

If you don't regulate it, it will suck the fluid right out of your bubbler. Also, when the HHO Power Cell hits operating temperature, it will run warm (especially with 20 Amps or more flowing through it) even hot, especially on hot days.

This causes the fluid and gases inside the Power Cell to expand while running. When you shut the engine off, the Electrolyzer begins to cool off inside. As it cools, it creates a reverse vacuum and begins to suck the water out of the bubbler back INTO the Power Cell. If you don't have a method in place to stop this, the bubbler will be sucked dry after the first use and the Power Cell will be overfilled, diluting the electrolyzer.

SO you MUST prevent this. There are various ways to do this. One way is illustrated in the upper 2 pictures. The VRV is the black knob at the top of the picture above. It is actually a Rain Drip irrigation product from Home Depot called a bubbler (on the right). It adjusts from full closed to full open by twisting the knob.

You can install it by drilling a hole and applying GOOP to base as you press it in. Open it just a little from fully closed and when off, it will draw outside air instead of water from bubbler. Do NOT open this very far- just a crack or you will get too much vacuum pull.

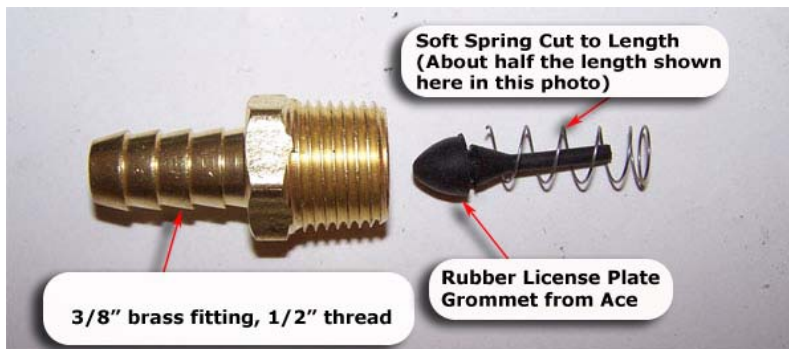
You can also use a more robust check valve from USPlastic.com they are lab grade vacuum/pressure check valves designed for gas environments. Apply it in your cap so a vacuum is drawn from the inside but it closes on pressure. These are cheap and my choice. We [include these in our kits](#) and as separate parts now in our shop.



We are presently testing putting them directly in line from our power cells to the bubbler, which does prevent water from being sucked back in, but does create a tremendous vacuum inside generator as it cools down

The HOME MADE Version

The last choice is a cool little cheap but very robust check valve that I made from parts at ACE hardware.



The parts are found at my local Ace, you'll have to check to see if you can find it at yours. The rubber grommet is from a Ford License plate holder I believe. The bullet shape works well with this design. It "Seats" in the base of the brass fitting and the spring tensions it keeping it closed until there is a vacuum drawn, where it is pulled down opening to allow outside air in. The spring in the picture was too firm so I cut it in half and stretched it out.

Drill only 1/2 way through then tap as discussed before.



Remaining base holds spring under pressure

Drill only halfway through the cap, then thread as I've shown you earlier.

The spring seats on the cap, the rubber grommet extends down through the hole keeping things lined up and the brass fitting screws into the threads.

You can screw/unscrew fitting while blowing down through the fitting to set the tension. You want it to open under very little

pressure/vacuum- to tight and it won't open.

There are other ways to do this, but these are the most inexpensive. I prefer the professional valves since they are cheap, but you have to buy in quantities. Whichever way you choose to deal with it, make sure you use one of them or you will be able to watch the water being sucked right back out of the bubbler as your electrolyzer cools.



Tail of grommet extends down through hole.

This end seals into inside of brass (or Nylon) fitting

Spring (not shown) goes between grommet and base

NOTE: Some of our users have reported the vacuum of the engine causing the bubbler to empty out because of the VRV; most of the time it is apparent with higher horsepower engines that have higher vacuum. I never had a problem with the home made design above because it does allow tensioning the valve. If yours gives a problem here, try capping off the check valve (Vacuum Relief Valve) to see if that stops it. You shouldn't use more than about a liter of water a week...

Other experimenters use a small solenoid valve that is normally open, but closes when electricity is applied. This keeps it closed while car is operating, then opens it when turned off, allowing external air in as unit cools. We may try this as well...As yet we don't stock them but we may if enough readers request them. Email me if you're interested at support@hhokitsdirect.com.

ATTACHING The Plate Stack To The CAP



Now, attach the plate stack to the bottom of the cap as shown, using 1 ½" SS bolts. Use Bonded Neoprene washers inside and out to insure the seal.

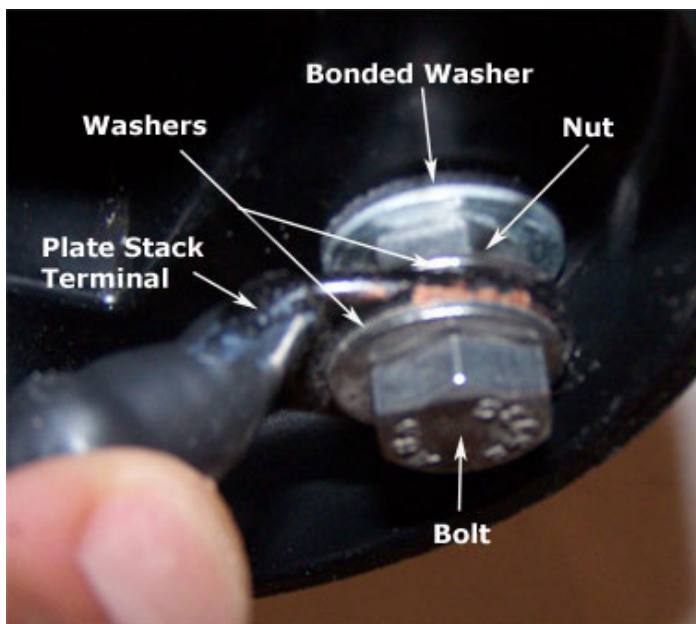
Here's a photo of a bonded neoprene washer. It's metal on one side and neoprene on the other. Clamped tightly they help seal and prevent gas leakage. I also like to smear some GOOP on the threads of bolts before inserting into the lid and clamping down to add extra insurance against gas leakage.

Assemble the bolts and plate stack to the inside of the lid like this:

You see a 5/16" SS bolt, a washer, the terminal from the plate stack, another washer then a nut

Tighten as tight as you can possibly tighten it. We even put a drop of Locktite on the nut so it won't loosen up.

There is a reason for this we will go into in a minute.



Here's a detail of the assembly installed in the lid:

The reason for the bolt AND nut inside the cap is CRITICAL.

The reason is this; if your terminals heat up (and they will get hot) too much, the ABS or PVC will soften and could even melt.

If you only bolt the terminal flush to surface of cap, and the unit gets hot, the terminal will "sink" into the cap. Once plastic re-hardens, there will be some looseness between the bolt head and terminal. As soon as the plastic heats up again under use, that gap will allow the MOVEMENT of the terminal and Bolt Head, which WILL cause a spark! **Guess what a spark does in HHO GAS?**



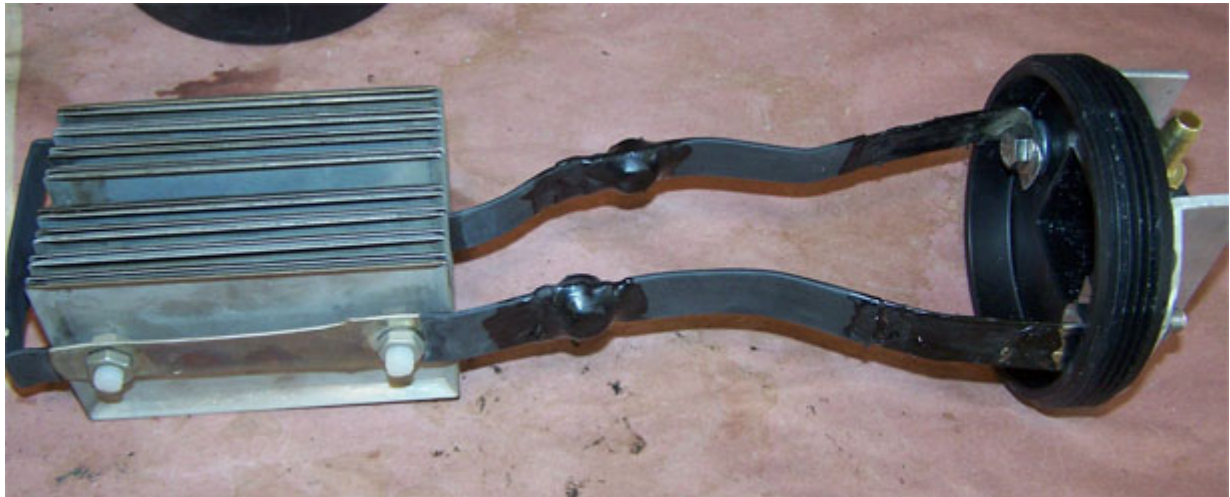
After you pass bolt through cap, place another bonded washer and another jam nut.

Then tighten everything up as tightly as you can. A locknut would be nice, but there isn't much room left on this 1-1/2" bolt. 2" bolts have shoulders, so you can't do the former step.

Once both straps are done, set it aside for later.

Here is a picture of an older completed plate stack/terminals/and cap assembly made so the plate stack sits on the bottom of the container. This was using the cheaper tongs (kitchen not BBQ) hammered flat – they caused too much resistance and heat melted top. SO use thicker stainless tongs and at first connections (closest to plate stack) switch to heavy copper cable connections or take straps up as high as you need.

You can also just buy 2 sets of BBQ tongs and measure/cut the full length so you wont have any connections but at the cap.



Terminals and connections are covered in liquid tape and shrink tubing up to the cap. Don't waste your time trying to insulate terminals with electrical tape alone – it WILL come off in the water and electrolyte.

We are considering pre-assembling these to sell if there is enough interest. Check our [online store](http://www.HYBRIDWaterPower.com) for details.

The Sight Tube

Whenever you have a liquid that needs to be maintained in a sealed environment and you can't see the level to maintain it (as in the Power Cell), you need a "Sight Tube". You can easily see what level the water needs to be maintained at by filling up the Power Cell canister and marking the sight tube at high and low points, so you know when to add more distilled water.

No hard and fast rules here. Any size will do, though $\frac{1}{4}$ " or $\frac{3}{8}$ " is most commonly used across the internet with this design. I originally used $\frac{1}{4}$ ", but $\frac{3}{8}$ " is much easier to see in the vehicle.

Just drill 2 holes in side of Power Cell canister as shown, and tap with a heated brass fitting as discussed earlier.

Screw in two right angle fittings, coating liberally with goop before screwing in, and it doesn't hurt to seal around it once screwed in as well, just as extra insurance. Let dry overnight and fill up next day with tap water to check for leaks. If it's good, and stays dry outside, you're almost there!

One quick note about water level: The Plate Stack will work whether it's barely immersed in electrolyte or sitting deeply. My choice is always to get it down as deep as possible so you have a larger margin of water before having to re-fill. The plate stack design is held off the bottom of the container by the positive electrode that crosses underneath and comes up the other side. This allows electrolyte to flow freely through the stack through convection currents creating a better production rate.

So if you can, get that baby all the way to the bottom. It works better from there!



The Bubbler

Though some designs out on the internet say you don't really need a bubbler, and recommend going right from the Power Cell to the engine intake, I have three words for you:

DON'T DO IT!

What, you never heard of backfire before? One speck of flame gets into that HHO tube and it will travel faster than you can say "Holy Moses"! And really, one blown electrolyzer can spoil your whole evening, so why take the chance?

That's why we make the added insurance of the Pressure Relief blow-off Safety valve! Do NOT neglect to do this!

Make a Bubbler! Don't be stupid... We don't like stupid. Stupid hurts, and usually stupid costs, big time. Learn from stupid, just don't be stupid. Get the point?

Interesting Fact: Did you know Hydrogen holds the world record for fastest burning gas? Gasoline by comparison is a turtle.

If you had a tube filled with gasoline vapor (the liquid doesn't actually burn too well) and lit it, it would burn at the rate of 4000 feet per second or about half the length of the Golden Gate Bridge in San Francisco in one second. Not bad until you compare it to Hydrogen.

The same tube filled with Hydrogen, **would travel 40,000 feet in ONE SECOND!** WOW! Ten Times the flame rate of gasoline. That's EIGHT miles in ONE second, people. I believe it works out to about 5 Golden Gate Bridges in length. Now That's fast...

THE BASIC DESIGN – SIMPLE AND QUICK!

There are various designs of bubblers out there. Again, it doesn't matter too much, as long as you have a few important design details...

This is the design I like because it cheap, quick to make, and it works.

Keep the container water separate from the Power Cell. They can be fastened together (the containers), but don't connect them water wise (like with a tube). The bubbler should be filled with regular tap water, it just prevents backfire from going into the Power Cell. Also, make sure you put a sight tube on it if you make one like at the right, so you can monitor water level.

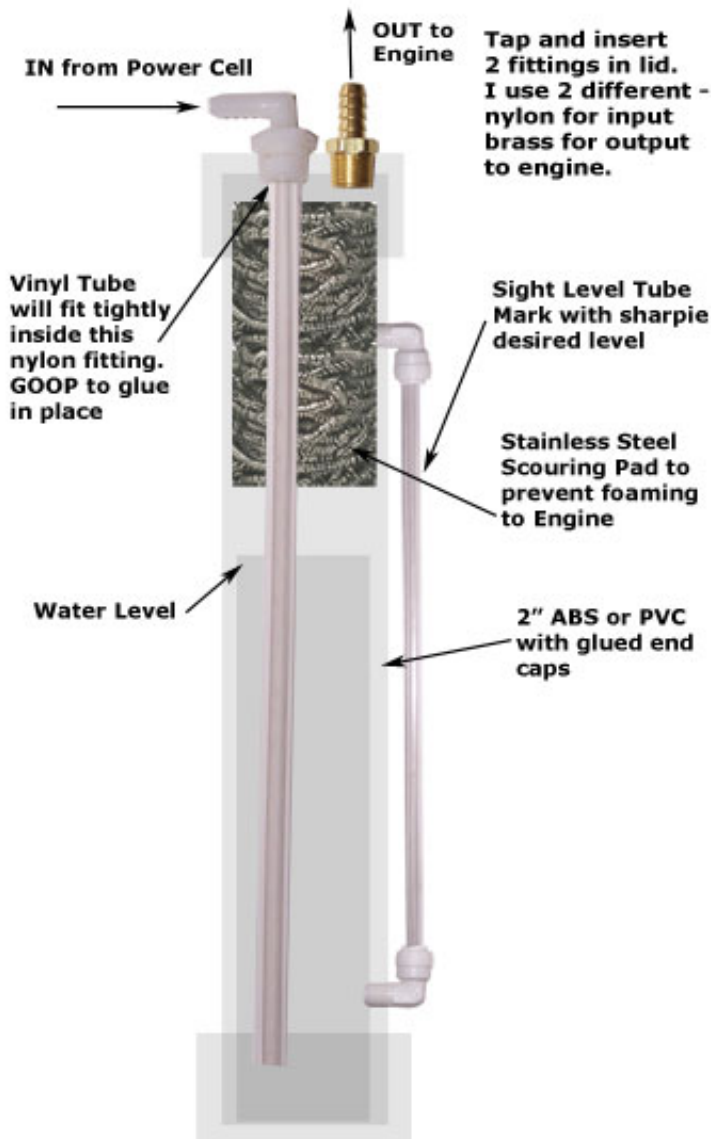
When I made my first one, I friction fit the cap (see photo on right), because I figured if there was a backfire from the engine, that the lid would just pop off.

After running it installed I noticed that the lid had loosened, probably from heat, so I wasn't getting the seal I needed and probably was leaking gas. Now I just glue the top on (after stuffing stainless scouring pad in top), and include a hole for the rubber cork Pressure Relief Valve. Again, you will have HHO gas accumulating in the top half of this container, if it explodes, it WILL do damage! Put in a PRV!

Do you sense an underlying theme here?



THE ILLUSTRATION – HOW IT WORKS



BUBBLER ILLUSTRATION

The bubbler is just filled halfway with water. The cap needs 2 fittings, one inlet coming from the Power Cell, and one outlet to connect to the air intake of your engine.

The inlet from the Power Cell should go through the cap and extend down into the bubbler, almost to the bottom. That way the HHO gas bubbles up through the water.

This serves two functions. The water actually filters and purifies the gas of any electrolyte, which could eventually harm the inside of your engine, and also is a simple check valve against a backfire as the water stops it cold.

The fitting I use and that is included in the check list, allows a press fit of a 1/4" ID vinyl hose. It holds nice and tight and yet can be removed if needed. But you can use whatever you want, as long as it serves the same purpose – to get that gas under the protective cover of water.

If you want the parts for these and other items, you can find them in our [online store](#).

THE EFFECT OF ENGINE VACUUM ON YOUR ELECTROLYZER SETUP

Also, do not forget to use the stainless scrubber in the top. It breaks the foam bubbles that can occur when your engine is pulling vacuum through it.

Here's a photo of one experimenters power cell made from water filtration unit. He is testing it to show off, on, and with engine running. Look at the effects of vacuum on a Power Cell in photo to the right. That's why you need something up there to break the bubbles and the water tension so that just the gas passes through.

You can see how quickly the vacuum foams up the electrolyte inside the clear container.



One example of an HHO Generator. Here it is just before turning it on, doing a test in the car.



Here it is as it begins generating HHO. Notice the amount of foam and bubbles generated.



And here it is with the car running. Notice the effect that car vacuum has on the production. This is why you leave space at the top for HHO.

Don't put the stainless scouring pad in the Power Cell, But DO put it into the bubbler!

One last note; there are some pieces of research I have found that indicate the ability of stainless, copper, and nickel all being used in the oil refinery business to help crack/refine gases. Maybe it can help here too. That's why I prefer it to plastic scouring pads.

I haven't tried copper yet, but intend to.

Make sure you get the **coarse looking, spirally wound type scouring pad**, not the steel wool, which I think may be too dense. Obviously, don't use anything that has soap in it like SOS pads. I wouldn't recommend the **regular steel wool either – It WILL RUST in the presence of water!**

The Electrolyte SOLUTION...

Well, you've made great progress if you have made it this far, and you can see it really is quite simple. You're probably already thinking about making one for your other car as well.

Easy Cowboy, one step at a time...let's get this first set of dogies in the pen first.

So you have your Plate Stack assembly, you have your container made, and you have your bubbler.

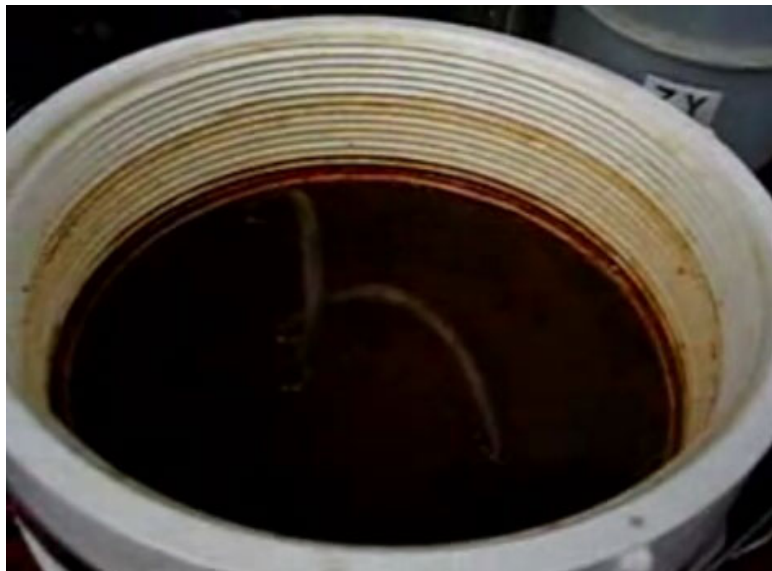
"I'd say you be ready for some HHO..."

Fill your container to the level needed to completely cover you plate stack, Use distilled water from your local grocery store – it's cheap (a lot cheaper than gas!) and it won't gunk up your Power Cell. Leave a 2-4 inches of air space at the top for production of HHO Gas and to help prevent foaming into the bubbler.

Let me re-emphasize. **Do NOT use the following WATER:**

- 1) Pond Water
- 2) Rain Water
- 3) Tap Water
- 4) Pee Water
- 5) Radioactive Deuterium Water
- 6) Toilet Water
- 7) Garden Hose Water
- 8) Gray Water
- 9) Landscape Water

...**Or any other water that is NOT distilled.** Oh, and don't use Deuterium Water under any circumstances.



I've seen guys use pond water and the next day have a Power Cell that is filled with slimy, messy gunk. Algae and rust and who knows what. It ruined their plate stack, which is the most important piece of the equation here, and takes the longest to make.

Here's a photo of one guys' Power Cell after just a day or two using pond water – gives new meaning to the word "Pond Scum"...

It completely ruined his Power Cell – was it worth it? I don't think so. Not when a gallon of distilled water is only .79 around here.

Tap water has trace chlorine and other minerals and chemicals like fluoride. It will gunk up too. Salt water or ocean water WILL conduct electricity, but it creates Chlorine Gas. Chlorine Gas + Lungs = Passing Out and/or death. I wouldn't recommend it.

If you are really tight on your budget, and can't afford distilled water, you probably can't afford gas for your car either, at least at \$4.00 a gallon as it is here in California right now (I read a news report that as of today it is now \$10 a gallon in Europe!) Holy Schmoly Batman!

Friggin' thieves. But how can you argue with Record Profits? I mean, they only netted \$30 billion this quarter, how are they able to survive?

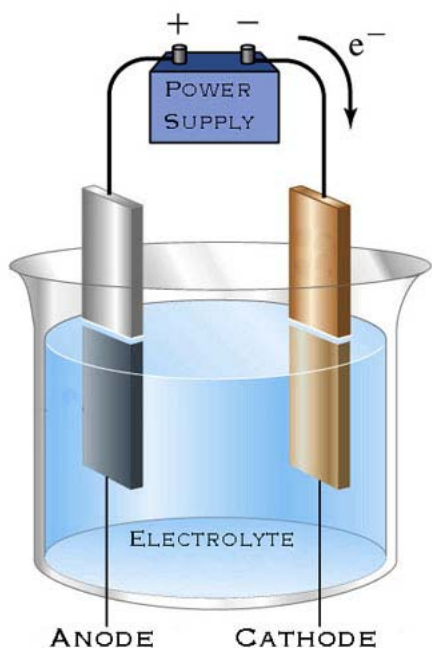
But I digress...

Where was I? Oh yeah. If you can't afford distilled or you just don't like the idea of paying for it, it's really quite simple to make a backyard distiller using plastic, a rock and a bucket.

I have included a FREE booklet that I put together for you, showing how easy it is to make a 10 Minute Solar Distiller in your backyard using a 5 gallon bucket and Tap Water.– Distill it first then it's perfectly safe to use (at least 6 of the 9 waters listed above)– I'll let you figure out which 3 to NEVER use.

Let's talk Electrolytes!

If you want current to flow through your electrolyzer, you need an electrolyte. Unless you're another Stanley Meyer – but more on that later...



There are various solutions available. The most popular book on the internet has a mason jar with stainless steel spiral electrodes. It uses baking soda (Arm and Hammer).

A lot of guys ARE using this, I've read various reports about it being dangerous (produces over 30% carbon Monoxide which is deadly if in large volumes).

The problem as I've stated before is the use of a **consumable** like Baking Soda **instead of a catalyst** like KOH (Potassium Hydroxide) or NaOH (Sodium Hydroxide), which are WIDELY used around the world.

Both are catalysts and both are caustic soda used frequently in drain cleaners.

Of the two, the MOST widely used is definitely the KOH (Potassium Hydroxide).

I personally noticed an **immediate increase in HHO gas production** when I went from a drain cleaner type NaOH to a Lab Grade Potassium Hydroxide Flake. I buy mine from a company in the Bay Area that now sells only through the internet. You can get some too at www.ArtChemicals.com.

If you buy any hazardous chemical online, you will have to pay a hazardous shipping fee, usually \$25 I think.

The other option that is showing merit, but I have not YET tried is the use of **PURE DISTILLED VINEGAR!**

One company that installs their own brand of electrolyzers into cars, has a 2 year record of successful installs. They found that over time, production can start to diminish with alkaline based electrolytes (They used Sodium Bicarbonate (Baking Soda)).

By switching to pure distilled vinegar, they have eliminated almost ALL maintenance issues!

This is going to be our next project for sure! I am getting ready to pull my long term Power Cell out of my van and open it up to check how everything's holding up to daily use.

I'll do some bench-testing first, then if it looks promising, I'll try it in vehicle. I'll report my findings to our members who've subscribed to our email list



Mixing the KOH and other electrolytes

Start out with 2 teaspoons in a small container with a few ounces of distilled water, and dissolve completely by stirring it up.



Carefully pour into your open Power Cell and mix with the distilled water.

Slowly lower the Plate Stack into your container until the cap rests on the top. Don't screw the cap in place yet until we measure current, and see if we need to add any more electrolyte.

Photo on left is of a melt down from too much current (OK, I confess-I wanted to see what 4 teaspoons would do☺)

The terminals got SO HOT they became embedded in plastic – could NOT be removed. I had to cut the wire to switch Plate Stack with a new lid!

SO be careful about the amount of solution with this design. And if you have trouble finding it, we may decide to stock it in our store...The only problem is it is considered a hazardous chemical and creates a whole stack of new paperwork and costs that we have to pass on to you.

POUR IT IN, HOOK IT UP, TURN IT ON; Let's MAKE SOME HHO!

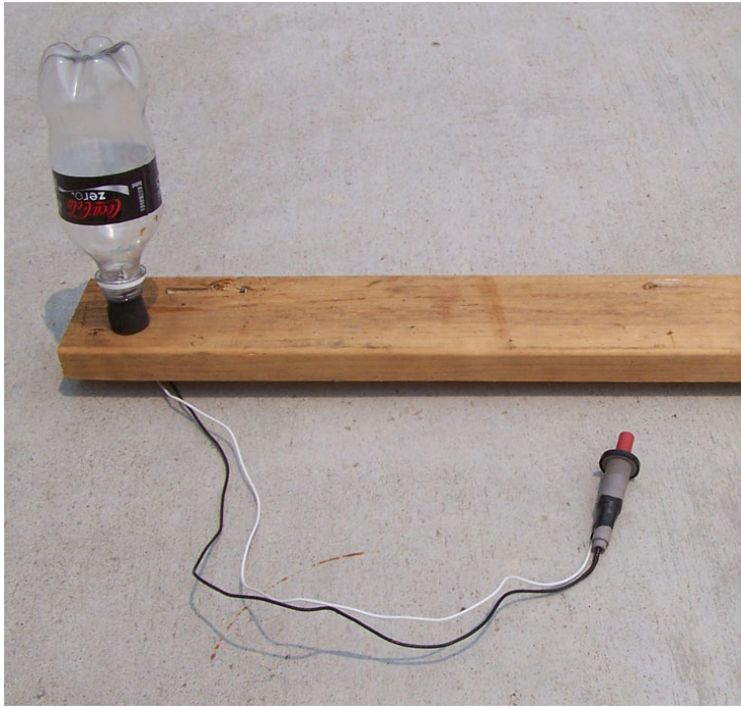
HOOK IT UP!

Hook the POSITIVE terminal of Power Cell to the POSITIVE terminal of battery, battery charger, or power supply on your bench. Hook up negative of power cell to negative of your power supply to turn it on. You should **INSTANTLY** see bubbles pouring off the plates and floating up!

Once you connect your cell and measure amps, you can see if you need to add more. I usually add a little more, but be aware it will cause higher current along with the increase of HHO gas. Too much KOH with this cell and you will melt the cap of your Power Cell – ask me how I know that?:)

MEASURE YOUR CURRENT!

You should aim for about 15-16 amps when cold and that will warm up to about 20 amps which is good for sustained operation on a cell like this.



Run your HHO through your bubbler or into a bucket of water as you break it in. Keep sparks away! Now's a great time to fill a couple of water rockets and light 'em off as your reward! If you haven't done it yet – take a break and

make the **quick bottle rocket launcher**

I show you how to make in one of the **FREE BOOKS included with this Manual!**

(Look at the end of PART ONE or End of this manual for the link!)

It's really easy and cheap to make and gives LOTS of entertainment value to friends and family. MOST of mine didn't really believe me UNTIL I started Popping off rockets (and exploding a few)!

Then their mouths drop open! Ya gotta do it!

One other note: Sometimes it takes a few days of "Break-in" to really make the plates produce. In fact, first time I plugged this design in, I saw bubbles in the water but no gas coming through into the bubbler.

I had to check to make sure everything was OK. Then all of sudden, it began pumping out HHO like no tomorrow, at least in comparison the other designs I had worked on.

Condition your plates before you install, and let them stay immersed in the electrolyte, even after you turn it off. They seem to work better after a few days, then level off.

One last note: If you are only bench testing using a car battery or battery charger, be aware that the production rate will be WAY more in your vehicle because the alternator generates much higher current at 13.5 volts or more. I almost doubled what I measured on my bench unit to when it went into the car!

About The Power Supply and Production Measurement:

I have an old, very used and abused Sears Battery charger. When I first began building, testing and researching HHO Power Cells, I figured it was sufficient – rated at 12 volt with switch between 2 amp and 10 amp along with an analog meter to show current being used, up to 15 amps.

I would build prototypes and test hook up with it. Now, I did get decent results at first. I mean, I was producing gas so that was exciting, but it would take over 2 minutes to fill a 700 ml container (filled with water, turned upside down in a bucket of water with the HHO Power Cell outlet house inserted into neck of bottle).

I then came across **zerofossilfuel's** (again from YouTube) design for a measurement tool which he wonderfully referred to as the **HHOMeter** (pronounced "H ammeter"). This stabilized and

standardized all my measuring capabilities. If you are going to play around with this stuff, spend a couple of bucks and make yourself one- it's worth it!

I've included a free booklet outlining the steps to making the one on the left, at the end of this book!



There is a difference in time measured from a bottle full of water upside down, to an empty bottle on an HHOMeter. In some cases 30 seconds less time respectively. So that dropped most of my test's that were taking 2+ minutes to fill, down to about a minute 30 seconds or 45 seconds. For the same design.

Now here's the point I want to make: The most significant production increase came from switching from a 12 volt battery charger set up to a direct 12 volt battery hook up from my van. That's right, I took it out of van, plopped it on my workbench. I did hook up the charger to the battery, to keep things charged, but my Power Cells suddenly came alive with a burst of power!

Even though the charger showed 15+ amps, something changed when hooked up directly to the battery. Much better current flow for sure, enough that I had to immediately cut back the amount of electrolyte because I melted the black ABS plastic cap from the terminals getting so hot! In fact, that cap was destroyed because once it cooled, it wouldn't work anymore.

I checked to see what was going on and lo and behold, the abs had liquefied and melted between the bolt and the electrode strap connecting to the plate stack, effectively insulating the two from each other!

So, I wanted to alert you to the fact that a battery charger may not give you the same results as a straight up battery. How much different you ask? How about dropping from 1' 30", 1' 45" to 30 SECONDS for 500 ml?!

That's right! 300% increase in production by switching to a battery! SO, the lesson here is, if you build one, don't get discouraged if the production isn't what you had hoped. Test it with a real battery- you'll be amazed at the difference.

If you follow my directions and build the "Power Cell" as outlined above, and you prepped the plates before assembly as I taught you, and you add KOH as your electrolyte, and you use distilled water, I PROMISE you, you WILL get at least 1- 1/4 to 1- 1/2 liters of HHO per minute in your production!

So make an HHOMeter, make the Power Cell, and use a battery to test. You WILL be amazed! So will your friends (those that don't think you're crazy).

And oh yeah, Don't be STUPID. We don't like stupid, and stupid shouldn't play with things like this. We are not liable for stupid. Be smart, and you'll be the envy of your friends and family!

Good Luck! Be Safe! Have Fun!

The ENHANCEMENTS

We touched on it in the first part of this manual; here are some more detailed instructions for you...

That STINKIN' O2 Sensor...

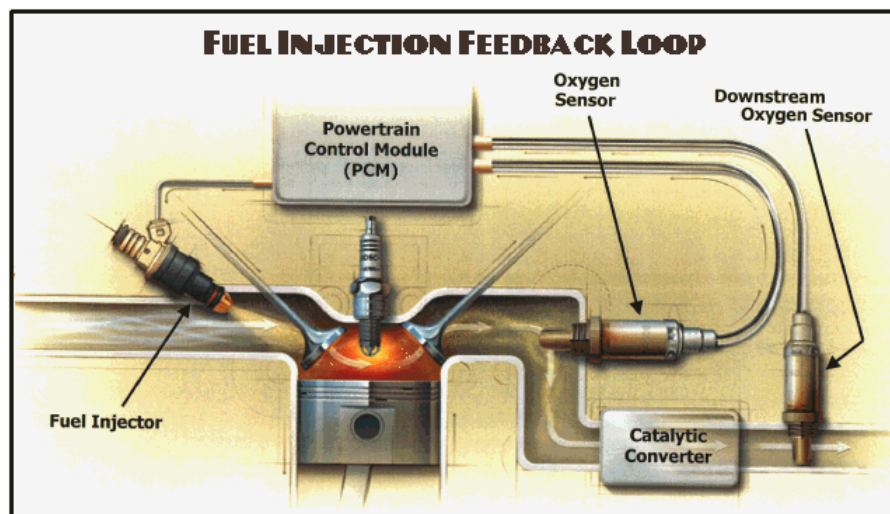
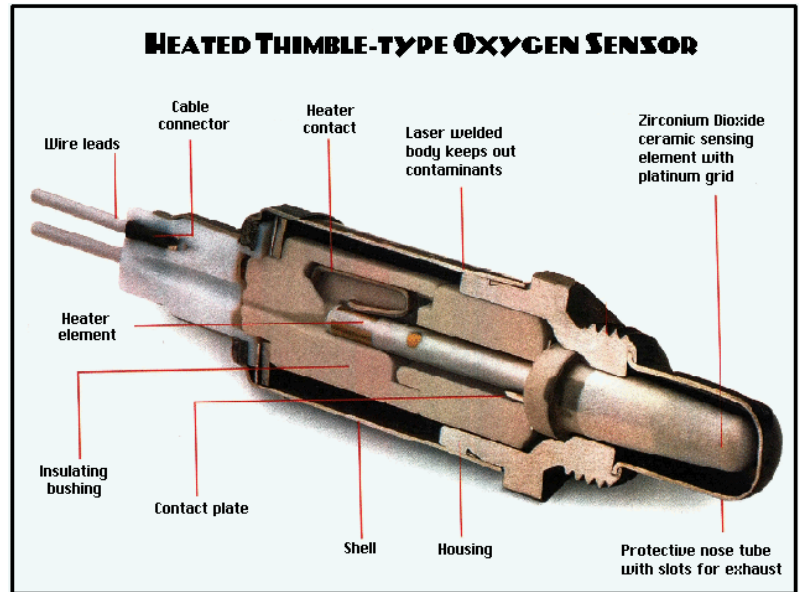
Ever had you wife smell something, then look at you and wonder if it was something you did (we're not talking about the real reason for global warming – men's fantastic flatulence foibles)

Sometimes for me, it would take 3 -4 minutes for the smell to finally register and get through my dulled sense of smelling. Some of us have a better sense of smell than others, and can pick up the slightest change "out of the norm", (my wife).

That is what an O2 sensor does. The hot, gaseous exhaust air flows right over the end of the sensor, which is manufactured to measure the amount of O2 in these gases.

This thing is the bane of every tuner out there. From guys who add high flow exhaust manifolds and catalytic converters on their rice rockets, to alternative fuel experimenters.

If your car has fuel injection, it has at least one of these, usually two. The first is generally located between the engine and the catalytic converter mounted right into the exhaust pipe. This is referred to as the "upstream O2 Sensor" and if there is a second one, it is after the catalytic converter, referred to as the downstream sensor.



Whether you're a tuner, a weekend garage mechanic, or an alternative fuel experimenter (are we all AFE's?) you WILL have to deal with these things.

They are directly connected to the Electronic Control Module or Electronic Control Unit (main computer) of the car, and use the measurement of Oxygen in the exhaust flow to determine if the car needs more, or less fuel.

Usually, too much Oxygen means the car needs more Fuel to burn.

BAD for us. We just happen to be making Oxygen, and Hydrogen and injecting it into the air stream. We are actually CLEANING up the air in the exhaust because HHO causes the gas to burn faster, cleaner, and cooler. The dumb sensor doesn't realize we are trying to help.

So instead of leaning out the fuel, it ADDS more fuel, and your mileage goes down. Aaah, technology- ya gotta love it.



Here's a close up of one just removed from the exhaust. Manufacturers suggest replacing these every 100,000 miles or less

The majority of cars have a Narrow band Sensor, the rest use a Wideband Sensor. Now in a gasoline powered car, the ideal mix of air to fuel (Air/Fuel Ratio) is 14.7:1, that's 14.7 parts of Air to 1 part of fuel.

The Narrowband sensors detect changes in this ratio from about 14.2 all the way up to 14.9 to 1. The sensors essentially measure the air coming through the exhaust and compare it to the outside air. It then sends a signal to the computer to adjust fuel up and down accordingly.

Don't Mess With...

So, in the past, this was a major problem. We were told "Don't mess with the computer, don't mess with the sensors, be happy." (with the horrible mileage we engineered into your car)...

Well things have changed! Thank God they have, or all of this would be for naught.

There are currently **Three** ways to deal with these bad boys. You cannot ignore them- they are bullies that will keep beating up your gas mileage until you knock them out and teach 'em a lesson!

We will probably offer stand offs and other enhancements in our store. [Check it out here.](#)

There are several ways to deal with these pesky sensors...

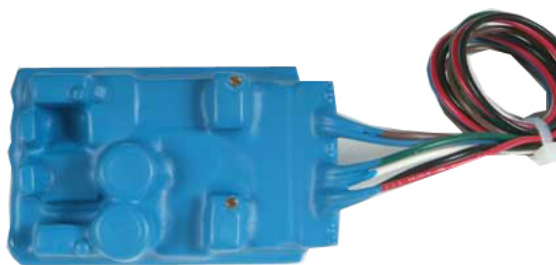
- **An electronic circuit** that connects in-line with the O2 sensor and converts the output signal from the O2 sensor as it gets sent to the cars computer. It essentially modifies this signal just enough to convince the computer that the car is running too rich on fuel (which is true!) and needs to cut back the amount being injected in, thus saving gas.



The only problem here is that you need a circuit board (EFIE – Electronic Fuel Injection Enhancer) **for EACH O2 sensor**. They can cost \$60 to \$100 each unless you can make your own from the free plans included in this book (Look in Installation and Instructions Section).



You can buy them already made for about \$60 from Eagle Research or \$120 for a dual EFIE from us [here](#). We think ours are the best-hands down. Worth the extra cost unless you have ready access to electronic parts and are good at soldering them up. They have the ability to insert your meter and adjust on the fly. On/Off switch allows you to go back to original setting of the car instantly.



there is no plug in capability. Still, it's the same board as used above and if budget is tight go with this or even a non- dipped one for \$69.

You can also get a Dual EFIE without the fancy schmancy stuff for only \$79 if you want. You can still adjust it, but you have to use a meter on the wiring as

- **A Metal "Stand-Off"**, which removes the O2 sensor out of the main flow of gases, but still allows some to pass by and allows the heat to still transfer.



These seem to work well and only cost \$20 for a couple pairs. I put 2 on my upstream sensors, it only took about 5-10 minutes each, and I have had no computer error codes and am saving about 34% on my gas!

There is no circuitry to burn out or adjust.... Sweet! There is one problem I had with them – I had to drill out the inside hole just a little larger to accept the O2 Sensor. I used a 3/8" bit in my drill press and a

little oil to lubricate the bit and it worked fine. I also found where you can buy them yourself locally for about \$5.00, if you have a drill press.

I'm not as sold on these as I used to be. I keep leaning more and more to the dual EFIE solution....

- **Aluminum Foil** - Even cheaper and simpler method supposedly works well for pre 1995 cars – a cheap piece of aluminum foil wrapped around the sensor and fastened with bare copper wire. (No tape as it will melt or burn next to the heat of the exhaust!) I have not installed this on any pre-1995 car yet, so I can't give you any feedback on this solution.



However, as part of our ongoing research, we are going to try this method on a later '98 Hyundai Tiburon, just to see if it works. We will probably compare it to a standoff and perhaps an EFIE circuit as well.

I will keep you posted...

A Side NOTE About The O2 Sensor Enhancement...

The first vehicle I installed an HHO Generator in was a 2001 Chevy Express with 5.7 liter engine. I hooked up and ran the "Power Cell" for a couple weeks to work out any bugs BEFORE installing the O2 Sensor enhancements, so I fully expected the mileage to go down, not up. I was pleasantly surprised to say the least.

I got a 20% improvement in gas mileage by JUST the HHO generator being installed, and it jumped to 34% improvement with the O2 Stand Offs on the 2 upstream sensors (nothing on the rear one so far), and an Exhaust gas Filter/Condenser.

This is NOT common from all my research. Usually the mileage goes down. Your experience may differ from mine. But don't give up if you install yours and don't get the mileage you want, until you try all the enhancements!

TRACK your mileage with each improvement – it will encourage you! If you need one, download the **mileage calculator** I made for you in Excel – it will calculate automatically after you feed in the numbers.

I spent the majority of time on the O2 sensor because of the importance of that issue. Please do not take it lightly, as it **will** affect your overall results.

The first way, and only way until recently, is to deal with them electronically, like fighting them on their level. Simple circuitry can fool them – if it's built right.

INSTALLING The Stand-Offs

The second way is a fairly new product that we are currently testing. It is a simple piece of Stainless Steel Hardware that removes the O2 sensor out of the main flow of gases, but still allows it to measure and send signals.



In my research, I tried to email and contact these guys, but got no response as to HOW it works. SO I ordered a couple anyway. It's cheaper than an EFIE (\$20!), and is easier to install.

I installed these and needed an extra one, so I looked around. I found this same product at a local auto parts store with one exception, they both had the small holes in the end, so one had to be drilled out. **The set of 2 was \$5.00!**

As it turned out, even the ones from Protium had to be drilled out because the big hole was still not large enough to fit my O2 sensors!

Here's what the set looked like from Protium:

(unfortunately they seem to have gone out of business recently)

You can choose to use one or both. They suggest using one first, and then use both if needed.

I started with one and decided to just go for the two like on the right side of this picture



Here they are laying down so you can get a good look at them. The wider one slips over the O2 sensor end. You use this if only one is used.

The other one on the left, with the small hole, is used to remove it even further out of the exhaust stream.



The two in a package (HELP! Components in Auto Parts Stores) look identical and are like the one on the left, so only one needs drilling out for the sensor. For \$4.95 it's BEST deal out there and they have worked for well for me!

These next 2 pictures show the drilling I had to do – before/after.

I used a 3/8" drill I believe, which makes the walls a little thin, so be careful not to crank down too hard or you will snap it off in the exhaust bung hole and then have to run to the hardware store and buy a broken bolt extractor and then go back and remove it and then make another set because you ruined the first..... sigh. Ask me how I know that?



Here is the finished install:



I have not had any problems to date and continue to have a 35%-40% increase in mileage with everything I've done.



I had no problem accessing them and removing with a regular wrench, but they sell an O2 wrench for about \$20 looks like this:

The slot fits over the wiring harness (which you should unclip first) and you can use a ratchet for tight places.

I didn't need to use it on the van install – there was plenty of room for a crescent wrench. But other cars have less room, so the socket makes it much easier – and you can use a wrench or a ratchet.

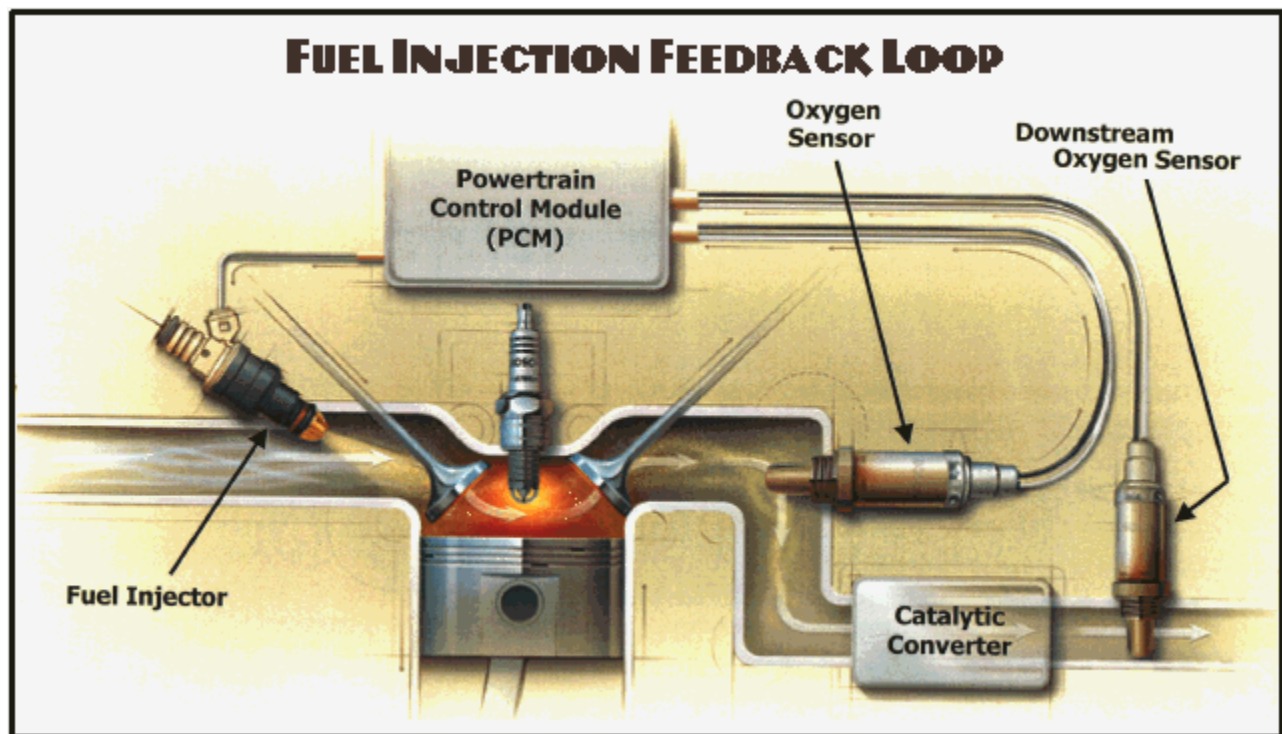
A CLOSER look at our electronics option:

The O2 sensor effectively talks to the computer with a variance in the voltage. Just a difference of 1/10th of a volt can trigger a reaction, resulting in more or less gas being sent into the fuel injectors. Electronics pros have been tinkering for awhile now, and a few have come up with some very sleek circuits that “trick” the voltage level coming from the sensor, so the computer “thinks” “Whoa! Too much gas, need to lean it out.”

Here's a great illustration of HOW the “Closed Loop” works. The fuel injector injects gas WHEN and FOR HOW LONG, depending on what information the computer gives it. The PCM (or ECU) constantly reads feedback from the O2 sensors in the exhaust.

If they read too little Oxygen, they tell the computer to cut back the fuel, too much and they think the car needs MORE fuel.

You can see why putting stand offs pull it out of the main flow of gas too.



I'm not an electronics expert. I can assemble a circuit if given the directions, but I couldn't tell you how to design it to do what it needs to do. But there are guys out there that have. If you are good with your hands, you could build your own EFIE as they are called (Electronic Fuel Injection Enhancer). There is a very thorough design available in the Public Domain (for free) out there and I've copied it here for you, as it is released for anyone and everyone to study and build.

He does a MUCH better job explaining it than I could, even explaining the complexities of each part of the circuit, why it does what it does, and how to build it from scratch.

He even includes a shopping list with most parts available at your local Radio Shack, the rest are available at an online electronics warehouse.

Because this is a very detailed section, I've moved it to the back of the book, to its own chapter, after the INSTALLATION section.

There is also a fully assembled "EFIE" circuit available online at Eagle Research for about \$60, but be aware they take their sweet time to make them.

Or you can buy his book for \$9.00 and make his design, which is simpler than the one referenced above.

Click on this link for the instruction manual...

http://www.eagle-research.com/store/index.php?main_page=product_info&cPath=2&products_id=15



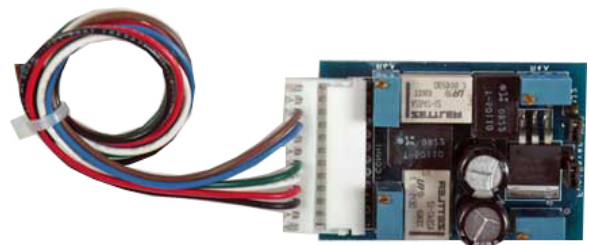
My only gripe about Eagle Research is that they are slow to fill orders sometime. They live and research up in the mountains, then come down to the shop to fill orders, so sometimes it can take weeks to get your product fulfilled, which is like months on internet time....

Too bad they don't allow downloads, they could really increase their sales...

Still, their motives are good and research is sound.

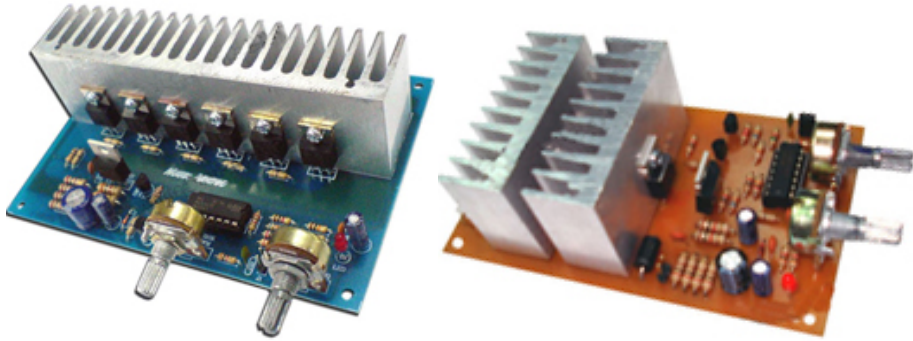
Remember, if you have more than one O2 sensor on your vehicle, you need an EFIE for each one that is considered "upstream", meaning between the engine and the catalytic converters. Usually 6 and 8 cylinder cars have two. Older 4 cylinder cars have one, but occasionally use two.

We now stock a good variety of these in our shop and are available by going to our [online store](#).



Here are a few of the assembled designs we now stock due to so many requests....From single EFIE's, to Deluxe Dual EFIE's to just Bare Boards, we now have it all on our shelves and ready for you.. **Order now, before you start your HHO generator so it will be delivered to you when you're ready to install.**

Great PWM finds now available as well....



We have also found a great deal on 30 Amp and 50 Amp Monster PWM's if you are interested we now [stock them here](#).

The Other Optional Enhancements

The MAP and MAF Sensor Enhancements

How Do THESE Work?

MAP SENSOR: The MAP (Manifold Air Pressure) sensor works by measuring the vacuum of the engine (which is why it is located on or near the intake manifold). When it measures lower vacuum, it generates a HIGHER output voltage signal that tells the computer more fuel is needed. If it senses higher vacuum (like at idle speed) it sends a LOWER voltage signal to the computer, telling it the engine needs LESS fuel.

If that was all it did it would be great. But the sensor combines that with everything else to give the computer a dynamic indication of engine load, which then determines when the best time to shift gears, and how to adjust ignition timing, even so much as changes in altitude or barometric pressure.

An enhancer directly adjusts this output voltage and allows you to "Dial In" a specific voltage manually. You can manually trick the computer into thinking the car needs less fuel (which it does since you are injecting a Hybrid Fuel into the intake!).

MAF SENSOR: The MAF (Mass Air Flow) Sensor measures flow and mass of the air Coming In (instead of the Vacuum like the MAP). It uses a heater element in the airflow and measures that heating element at cools. Obviously, the more airflow, the cooler it becomes, the more current is needed to keep that heater at a set temperature.

So the MAF measures how much current is needed and sends that to the computer which decides the amount of fuel needed based on the airflow (and other sensors).

The MAF on newer cars apparently uses higher frequencies, so the POT adjustments may not work here. The best way is to try and determine voltage variances by testing the leads into the MAF while revving up the engine. If there is a lead that varies the voltage that would be a good one to use.

So while these 2 sensors determine engine fuel needs in different ways, they still can be “adjusted” to help the computer understand you are actually trying to HELP the engine.

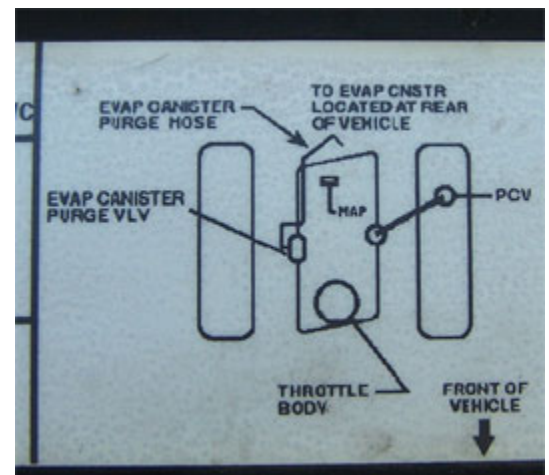
DISCLAIMER: These sensors are tied to your engines computer. Adjusting these may or may not affect your engines ECU. This is an experimental area and every car differs. We recommend you purchase your car's specific manual if you are unsure which wires do what. Use caution. We cannot be responsible for any harm that may occur from playing around in this area- you do so at your own risk! Some areas do not like people fooling with these (probably because of the increased mileage) so do so at your own risk (or at least make it easy to remove before inspection).

The MAP (Manifold Absolute Pressure) and the MAF (Mass Air flow) sensors are used to gauge and measure the condition of INCOMING air into the engine and the air pressure inside the intake manifold.

They use electronics to communicate with the engine and determine the condition of incoming air so the computer can determine how much fuel needs to be added to the motor.

The general rule of thumb seems to be that if your car has both a MAP and a MAF sensor, use the MAP sensor adjustment first. If your car has just a MAF, try to tap into that for sure.

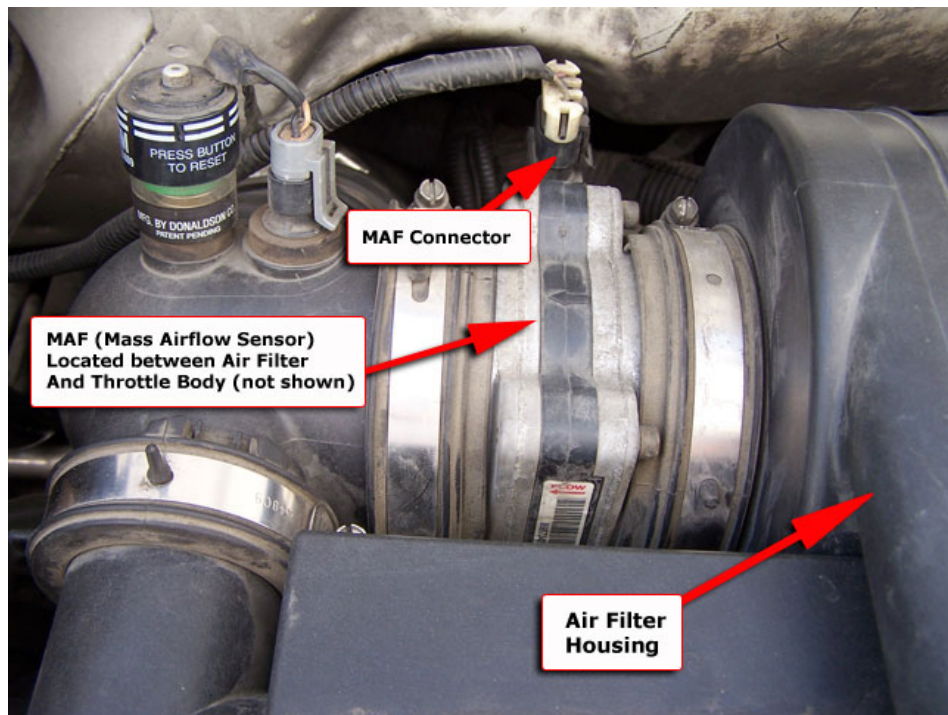
The photo at the right shows the position of the MAP sensor in relation to the engine. It is mounted on the intake manifold, towards the back of the engine on this one.



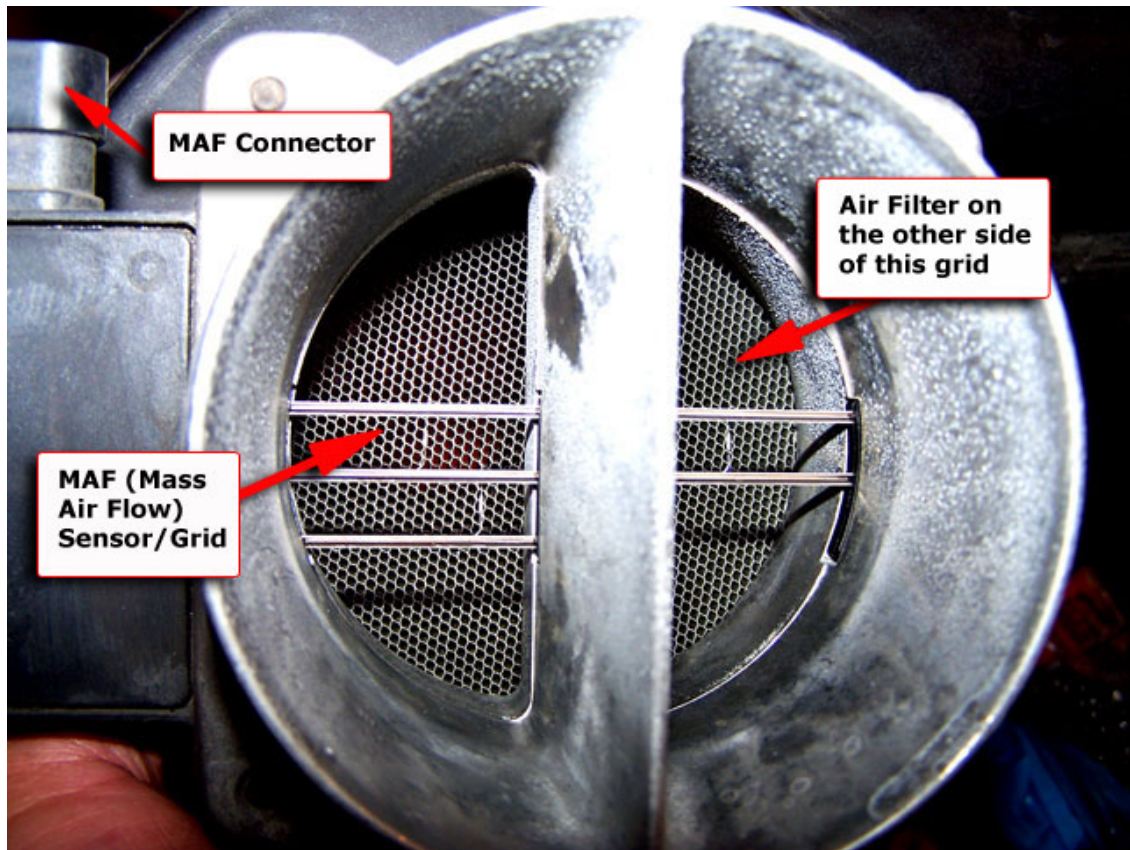
Below is a picture of the MAP sensor on that same vehicle...



Engine is dirty, but hey, it has 100K+ miles on it!



So that is what the MAF Sensor looks like on the **outside**, let's take a look on the inside:



I removed the whole assembly on the left in top picture so you could see a unique perspective of this important sensor.

If you look closely, you can see the little glass beads in between the electrodes extending horizontally across the middle of the opening. The sensors are generally heated with a certain level of current and voltage.

As the mass air flows around them, they cool, requiring more current to heat them back up to their proper temperature. The computer reads the flow and the voltage/current required to keep the sensors heated, and determines how much fuel the engine needs.

Really pretty cool if you think about the engineering aspect, but it makes it hard for backyard mechanics to tweak the engine if they desire.

There are some guys who actually add an extra air inlet after the MAF sensor, in between the sensor and throttle body. They rig up a manual choke valve and cable and manually adjust it for better mileage.

By allowing bypass air into the system, you "trick" the sensor into thinking the engine needs less gas simply because less air is flowing through the air filter and MAF sensor.

You can't do this with some engines because the MAF is installed right on the intake manifold.

So that being said, there are many circuits available on the internet to "adjust" or give you the ability to adjust this MAF and the MAP sensors.

I've included one in the Installation Part of the Book that was designed and posted by another experimenter on an energy related Forum, if you have a basic understanding of electronics, you can **easily** make one.

If you want to buy one to try and don't want to assemble it, I've included a few links in the Installation Part of the Book – they are only about \$70 and can really pump up your mileage. This one from Protium Systems (out of business now) allows you to manually adjust for City, Highway, Performance, or Normal.



We will be testing these on some of our upcoming projects...

Those that use them swear by them as the most important part of the Hybrid Fuel Upgrade. You can manually lean out the gas to your preferences and use, or turn it off completely. Your choice, not the computers'...

Understanding what's happening in a MAF

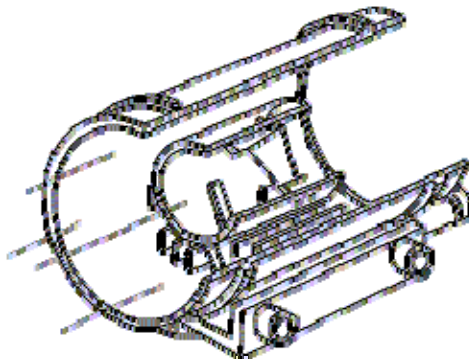
Here is an article that describes the process in more detail:

The Mass Air Flow Sensor is probably the best way to measure the amount of air an engine takes in (engine load). This sensor not only measures the volume of air but also compensates for its density as well. Ford, GM, and many imports are using engine control systems based around this sensor.



There are two common designs of MAF sensors used in today's vehicles. One produces a variable voltage output (analog) and the other produces a frequency output (digital). In either case their operation is similar. Both outputs can be measured by a scanner or a digital volt/ohm meter (dvom) that can measure frequency.

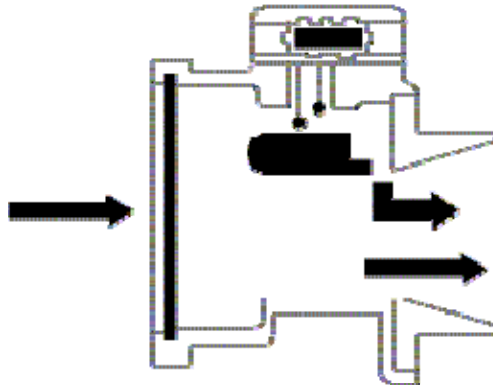
Both designs work on the "hot wire" principle. Here's how they work. A constant voltage is applied to the heated film or heated wire. This film or wire is positioned in the air stream or in an air flow sampling channel and is heated by the electrical current that the voltage produces. As air flows across it, it cools down. The heated wire or film is a positive temperature coefficient (ptc) resistor. This means that it's resistance drops when it's temperature drops. The drop in resistance allows more current to flow through it in order to maintain the programmed temperature. This current is changed to a frequency or a voltage which is sent to the computer and interpreted as air flow. Adjustments for air temperature and humidity are taken into consideration since they also affect the temperature of the heated wire or film.



GM (Bosch) Hot Wire MAF Sensor

Humidity always affects the density of air since humid air is denser than dry air. No other compensation is therefore needed for this factor. Air temperature affects density since colder air is more dense than warmer air. Many systems use an air temperature sensor to compensate for this factor since similar amounts of air can enter an engine at different temperatures. Some MAF sensors use an internal "cold" wire to send ambient temperature information to the computer. Some use an intake air temperature sensor in the manifold or the intake piping. This sensor is almost always ntc in design (negative temperature coefficient). That is, it's resistance goes up as air temperature goes down. This "thermistor" works just like a coolant temperature sensor and

usually has identical resistance to temperature values. By the way, these values are very different from manufacturer to manufacturer and are available in most repair manuals. They are also programmed into scanner software.



Ford Hot Wire MAF Sensor

Now, as we discussed, the MAF sensor sends either a variable voltage or a changing frequency to the computer. The computer is programmed to accept this information when the car is running in any mode. For example, idle rpm will send a low voltage or low frequency and a high revving engine will send a high voltage or high frequency to the computer along a specific wire (the MAF signal wire). If the signal is not present when it should be and within a programmed parameter, say high voltage at high throttle opening, the computer will set a code.

So, there are several things to consider whenever there is a code which points to the MAF sensor as the problem:

1. Derive the code(s) by the manufacturer's recommended method.
2. Look up the code(s) in a service manual.
3. Read the explanation(s) carefully!
4. A code that indicates an out of range signal is often an indication that another sensor, like the throttle position sensor or the rpm input signal is contradicting the MAF signal. The cause might be the other sensor or signal being out of adjustment or faulty.
5. A code that indicates a low MAF signal may be set by various problems. These include the following:
 1. A bad MAF sensor (internal fault)
 2. Any wire on the MAF sensor circuit including:
 - A. The 12 volt feed wire which connects the MAF to the battery through the ignition switch or through a relay as in many GM applications
 - B. The MAF ground wire
 - C. The output wire

D. The MAF or computer connectors

E. The computer

Note: The GM Bosch style system used on 5.0L/5.7L Firebirds, Camaros, and Corvettes have a hot wire "burn-off" feature that uses a relay to burn any impurities off of the hot wire. This system will set a code if the ecu controlled side of the relay fails.

AFTERMARKET Accessories

You can buy aftermarket MAF's as well, but they can be pricey from \$150-\$350 and up!

Here are a couple of examples...



You can find MAF/MAP sensor units available on the net or on Ebay as well. Here is one seller's description and pics.. (I have not tried this unit, just showing you what's available. I can't vouch for the manufacturer of these units or their quality...



Better MAP Sensor Design, choice of colors, knobs, etc. - Very popular design!

SALE PRICE: \$67.95 - limited time offer

- **Red LED light shows ONLY when system is switched (down) to the "Start" or normal position.** This is so the light will not shine in your face during the majority of your driving (**Patent pending and design copyright 2008**). **In practical application this light is much more important than a person may first realize.** In every day driving many drivers forget the HHO system is installed and the map sensor is even there. Simply switch the system to the "Start" position and anyone driving the car will understand what to do. The "Start" LED light is a great reminder and does not shine in your face when driving in the enhanced mode, which is 99% of the time.
- **High quality Linear Smooth Sweep Potentiometers provides a continuous even transition from gas to HHO.** No jerking or stalling, just dial in the mixture you like for city and highway and use the switch from then on.
- **FULL RANGE.** We use the highest quality linear potentiometers. We checked others and the parts were not near the quality. Don't skimp on this important part. you will find that our very little box is packed with the highest quality components, no room left in this compact case - very tight.
- **NEW:** numbers around the dials for reference.
- **Dial it and leave it!** Simply dial the setting that works best for city and highway and use the switch from that point on, or play with the settings as you like.
- **Let's say you are driving** on the freeway and come to a hill and feel like you need more power. You can simply switch to the "City" setting, or dial the "Hwy" setting down to inject more gas.
- **Your choice of colors** (light gray, black, translucent blue), knobs, and where the wires exit the enclosure.
- **NOTE:** The translucent blue case will have no letters or numbers - Kind of cool looking.
- **Good looking small design for your car or truck.** And yet if you looked inside you will find the most substantial potentiometers and parts available - very high quality.
- **Smallest design available anywhere.** Fits in more places than other designs, looks better. **Enclosure is only 3 1/8" x 1 1/2" x 3/4"**. We suggest using Velcro for mounting.
- **Design works on most all makes and models.** HHO MAP Sensor characteristics are to spec with the Water4Gas MAP sensor design. The only difference is the LED to remind you the system is in the start mode. Remember, the only way you will save gas is to switch the system to the HHO position after it is started and the HHO is generating.
- **Do I need an O2 sensor control?** Information on why you **DO NOT** need an O2 sensor control and how to get around this problem - but you do need the MAP unit.
- **Superior MAP Sensor.** If you build you own system, this is the only part you want to actually buy pre-made as it is complicated. Here is the best one on the market.
- **MONEY BACK GUARANTEE** if you do not think this is the best MAP unit of all. **Made in the USA**
- **BEYOND HHO - FREE BONUS** - These tips alone will save you twenty MPG in fuel mileage. \$\$\$ value.
- **NOTE:** Pigtail Molex wire connectors (shown in one of the pictures) **is a five dollar option.** Please tell us if you need this option.
- **Buy It Now** and it ships sooner. All US shipments are sent by US Mail.
- **If the voltage to your MAP** is more than two volts we need to know so we can change the resistor for the light.
- **Please be patient** if we are slightly back ordered, this has been a very popular item.

If you are adventurous, you could test and try your own version like this one from Ozzie at Water4Gas...

THE MAP ENHANCER

The invention we're talking about here is a simple play with resistors. The potentiometer ("pot" for short) is a variable resistor, which varies its value by turning the knob. There is a second resistor, a fixed value resistor, in series to the pot as shown in the diagram below.

The MAP or Manifold Absolute Pressure Sensor is a small device installed in your intake manifold, like this one here, or installed on the firewall and connected to the manifold with a hose.

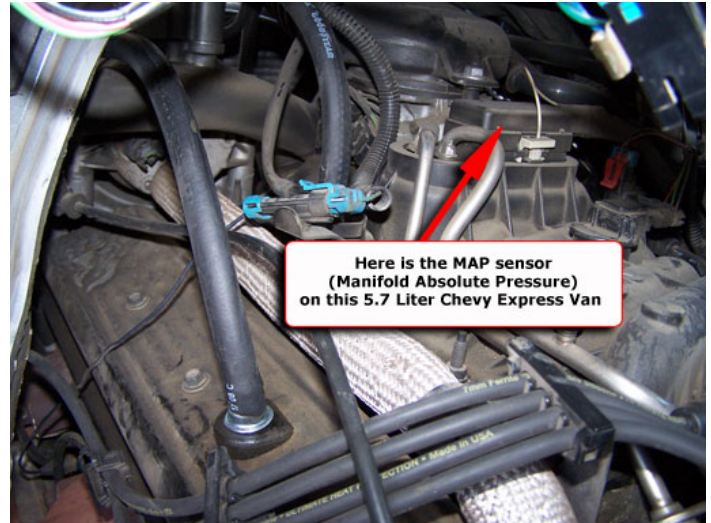
It has 5 Volts or 12 Volts coming in, and it senses the vacuum in the manifold and reduces voltage by a certain factor according to strength of vacuum.

In other words it reduces the supply voltage to a current voltage in the range of 15% to 60% of the supply voltage (numbers will differ by car), and this varying signal is then sent back to the computer.

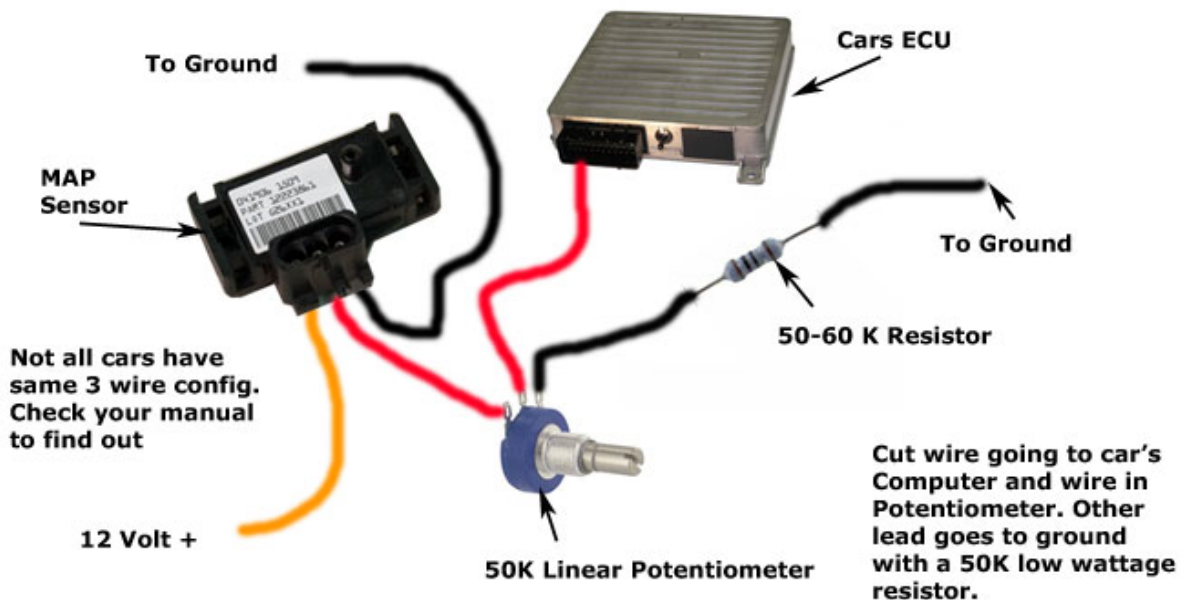
The arrangement of resistors simply takes this already attenuated signal — and reduces it further.

Too much resistance kills the engine, it will simply shut off. BUT, **if you control it correctly you can lean down the mixture** which is factory set at 14.7:1 (14.7 parts of air to 1 part gasoline) — down to 20:1, maybe even 50:1 or 100:1.

Think of it as a manual control knob to constrict the flow of gas into your engine.



This is for a single POT set up....

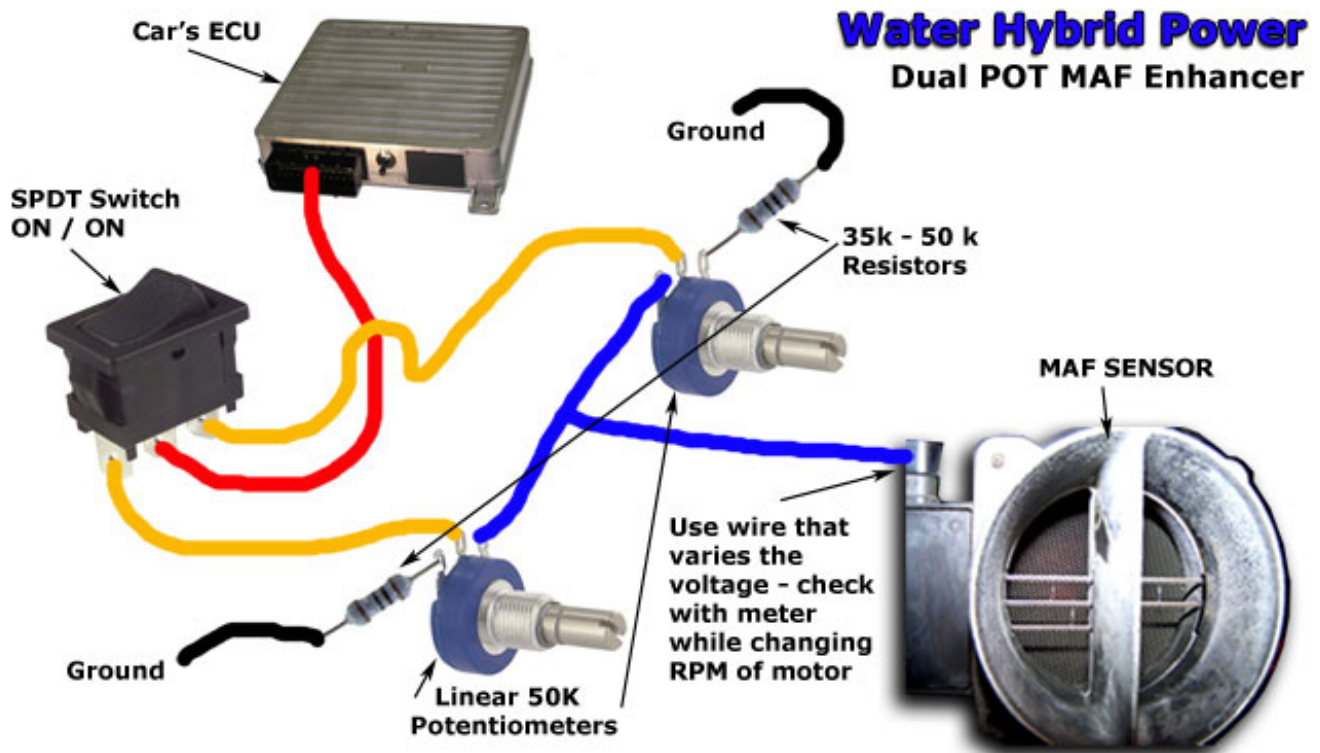


Water Hybrid Power MAP Enhancement 1

If you want to run two Pot's for more control over city/highway driving, use the below layout (for MAF) sensor. To use same setup for MAP, just substitute wire going to MAF for wire going to MAP sensor.

The SPDT switch allows you to adjust 2 settings — one for city driving and one for highway. AN extra ON/OFF switch could allow normal settings to take place.

We may pre-assemble some of these or offer them in kits, [check our online store](http://www.HYBRIDWaterPower.com).



If you are not sure which wire to use on the MAF sensor, hold a meter to each wire as you rev up the engine to find the one that varies in the voltage the most and use it.

CAUTION: Many newer cars use higher frequencies for the MAF and regular potentiometers like that shown above do not work. If you have a car with a MAP and MAF, use the above schematic and wire it into the MAP sensor instead of the MAF – generally you will have more control that way.

As every car is different, you **MUST** be careful when working around these signals and computer sensors – one wrong short and you could ruin your ECU or PCM. We take no responsibility for damage to any area if you choose to experiment here.

HOW Do I Adjust The Sensors?

The computer has been programmed to re-adjust and “Lock-In” to constant-rich mode when it senses something different than what has been programmed (how convenient for the auto-makers and Big Oil companies).

Some users of these enhancers, recommend unplugging the “Upstream” O2 sensors (closest to engine) to prevent this. I haven’t tried this and I’m not sure if it would result in a Check Engine or Service Engine light coming on.

These are the steps that are recommended for trying to get the best lean fuel run on your vehicle:

REMEMBER: NEVER lean out your engine without adding an alternative fuel of some kind! The extra heat generated can burn valves, pistons, walls, etc. and generally mess up your engine, especially if you are pulling a heavy load or traveling uphill a lot.

- Start by turning the knob to full rich position (counterclockwise if hooked up like in the illustration) which will be the factory setting with no input from your enhancer.
- Turn on your Hybrid Water Power Cell and make sure it and the engine are warmed up. Go to a side road or lightly traveled area in case your engine stumbles or stalls while adjusting.
- Slowly start turning knob clockwise which will cause the fuel to be leaner and leaner. At some point it will be so lean the engine will start to stumble or stall. Back off the adjustment until its running smooth again

Remember to NOT do this if you don't have a hybrid fuel being injected into your engine – you could damage it.

Also, if you change gas companies or there are severe weather differences, etc, your settings may have to be tweaked from time to time. If it starts to stumble, just back it off a notch or two.

This isn't rocket science, but you just have to be aware that you are overriding the computer, because you have a better way. It doesn't know how to handle your new set of parameters and it doesn't want to learn (sounds like a bureaucracy to me).

There can be a vast difference in your mileage readings depending on how you adjust these. An experimenter one week got a 52% MILEAGE INCREASE, but next week it dropped to only 24.5%. The determining factor seemed to be that he had dialed too close to the choking point of the engine.

By backing off within about a ¼ turn off the factory setting (Full rich), his mileage jumped back up.

So don't get greedy here and try to starve the engine to death, it may bite you!

CONCLUSION: I think the MAP sensor is a great way to play around with manually overriding a basically dumb computer. If we are ever to make headway into better mileage and better environmental results, we cannot continue to treat things the way they always been treated. There is risk in change, but there is also reward. If you are not a person who likes to take a risk, be satisfied with what results you can get from the O2 sensors and the other enhancements!

The Fuel Pre-Heater Enhancement:

This is another Optional item that some are using in addition to the others.

It is quite simply, a few pieces of brass or copper tubing inserted into your fuel line before it gets to your carb or fuel injection rail. It uses the hot water of your radiator to heat up the gasoline before it reaches your engine.

The theory is it is supposed to help the gas vaporize by raising its temperature to approx. 170-190 degrees (which is normally too cool to vaporize, but hotter than ambient air). This is a picture of one from our friends at Protium as well.



It looks to be a unique soldered set of copper tubing, and has a patent pending. From the picture, I would say it is simply a piece of $\frac{1}{4}$ " or $\frac{3}{8}$ " copper tubing that is inserted and looped into a $\frac{3}{4}$ " piece of copper and then back out again. The fuel would flow through this. The larger tubing (looks to me) would probably hook up in line with a heater core hose (just a guess). The hot water would flow right over the fuel tube, transferring the heat efficiently. I LIKE it!

They claim it can help by as much as 10%, but I have not tested it yet, but have plans to order it. When I do, I'll let you know.

Others use threaded $\frac{1}{2}$ " or $\frac{3}{8}$ " brass fittings available at local hardware stores, that are pieced together to form a "U" shape, then connected inline with the fuel. This version is then attached to the outside of a nearby radiator hose to transfer heat to the gas that flows inside it.



It **MAY** help a few percentage points, but we don't currently use them because the improvement doesn't warrant the time, in our opinion. The transfer of heat wouldn't be as great to me, but for a few bucks you could put one together.

If you do, let us know. We will probably try it on one of our test vehicles as well.

I DO like Protium's idea though. They claim a 10% improvement in mileage. It looks like it hooks up to one of the heater hoses is my guess. They're only \$50 and with gas at \$4.00+, it doesn't take long to make up the price especially with today's copper prices!

If it does add 10% in mileage, it's worth it!

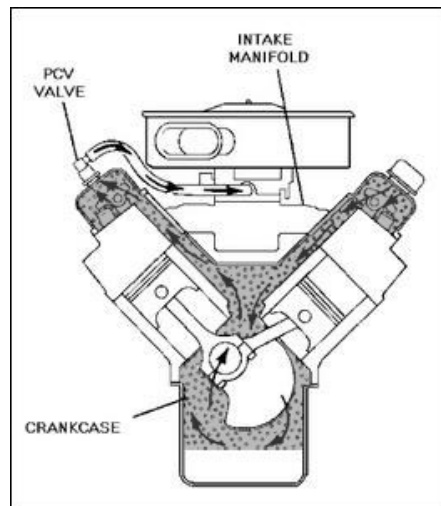
LAST But not LEAST is the PCV Condenser!

Some of this info is redundant from the first half of this book, but I've included more photos and info, so I recommend reading through it again...

The crankcase ventilation system, often called positive crankcase ventilation (PCV), consists of a PCV valve, its vacuum hose or line, a supply hose providing air into the crankcase, and on some older applications, a breather filter to clean the air provided to the supply hose.

The purpose of this PCV valve is to regulate the flow of crankcase fumes into the intake manifold where they can be burned (Prior to 1963, cars had no PCV and used tubes that just left the hydrocarbon emissions from the crankcase out into the open air).

The PCV valve is also a check valve, to prevent flow back into the crankcase. This prevents potential ignition of the crankcase fumes, should the engine backfire. It is also crucial for proper engine sealing because it alleviates crankcase pressure, which can push out on seals and gaskets, contributing to oil leaks.



There have been various ideas, inventions and patents formed around the idea that the Exhaust Gas Recirculation through the PCV (Positive Crankcase Ventilation) valve, while a good idea, in practice it shows itself to be a messy gas grabber.

It is not unlike taking the garbage from the engine and feeding it back into the intake to help recycle what wasn't digested the first time. No filter – just blow-by gases fed back into the engine.

Kind of like you taking your waste and eating it, in case there were any nutrients left...UGH!

So if you can filter some of that burnt exhaust that's being recirculated through the engine and condense the gas vapors, you should see a positive bump in your mileage.

There are various methods to do this, many on the net in public domain. The one that has been around is one from KeelyNet about using two different size cans, one filled with copper coated BB's and then filtered. The balls condense (and possibly chemically crack) the hot exhaust gases into hydrogen and oxygen, and the sludge/water separate and fall into the mason jar, while the unburned, concentrated gas vapor can be returned back into the engine to burn.

The description is posted in the "LET'S BUILD IT" section, but is a little hard to understand, so I put a **very** quick little concept sketch together to help you understand the concept being described in the BBS posting. Sorry for the amateurish nature but I didn't have much time to spend on it...



Quick Concept Drawing of the Keely Net PCV Jar

With this PCV Jar, the gases are sucked in through the main tube (From PCV Valve which extends into the BB's and out through the bottom (just window screening clamped on). It goes out from there and into the intake manifold to be mixed with incoming air and fuel and re-burnt.

We may offer an enhanced version of this in our store depending on demand.

Many are getting 10%-25% increase in mileage using some variation of this.

I currently use a smaller, easier to put together version learned from Ozzie over at Water4Gas, who has contributed his version into public domain.

He built one using a **small** "Husky" air filter (available at Home Depot) used for air compressors to filter water vapor out.

Here's a picture of the 2 models available at Home Depot:

He uses the smaller one – it's only \$11.00 so it's cheap.

Ignore the plastic fitting on it- it was to test the size of the threads and I forgot to pull it out before taking this picture.

ALWAYS use brass fittings as these are exhaust gases and they will melt things if you



get my drift....

There's not much difference in size between the 2 interior "Zinc" filters, but a huge difference in containers. I like the saying "Go BIG or go home!" so you can guess which one I use.

I also bought Silica Gel Beads from www.Grainger.com and stainless balls from Walmart to use in mine. Here's a close up of what they look like inside...

I also put some inside the zinc filter, but they seemed to clog up too quickly there, so I just leave them in the bottom.

Not shown here is the **2 layers of screening (regular window screening)** used. I cut out 2 circles about the size of the black outside ring in the picture above, then pushed them down in tight on top of the beads.

This is **to prevent any beads from being sucked up into the engine** at high vacuum, just a precaution.

Silica beads and copper coated BB's can be found online or we may stock them in the near future depending on requests.



Here's another view of the container and size of larger filter. I added enough beads to reach the bottom of the internal filter, so it helps hold the screening in place.

Also, there is a drain valve there at the bottom to drain off excess water vapor.

Unfortunately, it is NOT designed for vacuum, which is what this filter will be operating on. If you don't add something on it, you WILL have a vacuum leak and your engine will stall.



I tried a simple clear tubing with a melted end slipped on it. It worked for a day or so, but then the heat (engine exhaust recirculating!) and the sludge oil gathering in the bottom caused it to slip off on my way home one day which caused my engine to stall in the middle of rush our traffic!

It was NOT a pretty sight. When I realized what had happened, I searched for the tube, but it was gone. I scavenged through my car and found an old pencil, which I crammed up in the opening with some force (I was





already angry and frustrated).

Voila! The engine started right up and I prayed all the way home that it wouldn't fall out.

Needless to say, that was fixed immediately.

This is a picture of what I saw when I pulled it out.

You can see the Silica beads were definitely absorbing stuff as they were dirty.

I dumped everything into a bowl to look at it. I rinsed everything out in paint thinner, let it evaporate for an hour, and then put it all back together.



The Lid Filter



Here is a close up of the lid. The ring is actually the zinc filter that comes with it and is usually the only thing that filters the water vapor as it comes through in normal use. Here, I tried filling it up as well with Silica Gel beads, but I found they clogged too quickly, so I removed them.

Now filter is hollow inside, with beads and bearings in bottom.

I'm going to try copper BB's next ...

After everything was cleaned up and put back together, I ran to auto parts store and picked up a small emissions type hose designed to take the heat, with an opening small enough to fit over the drain

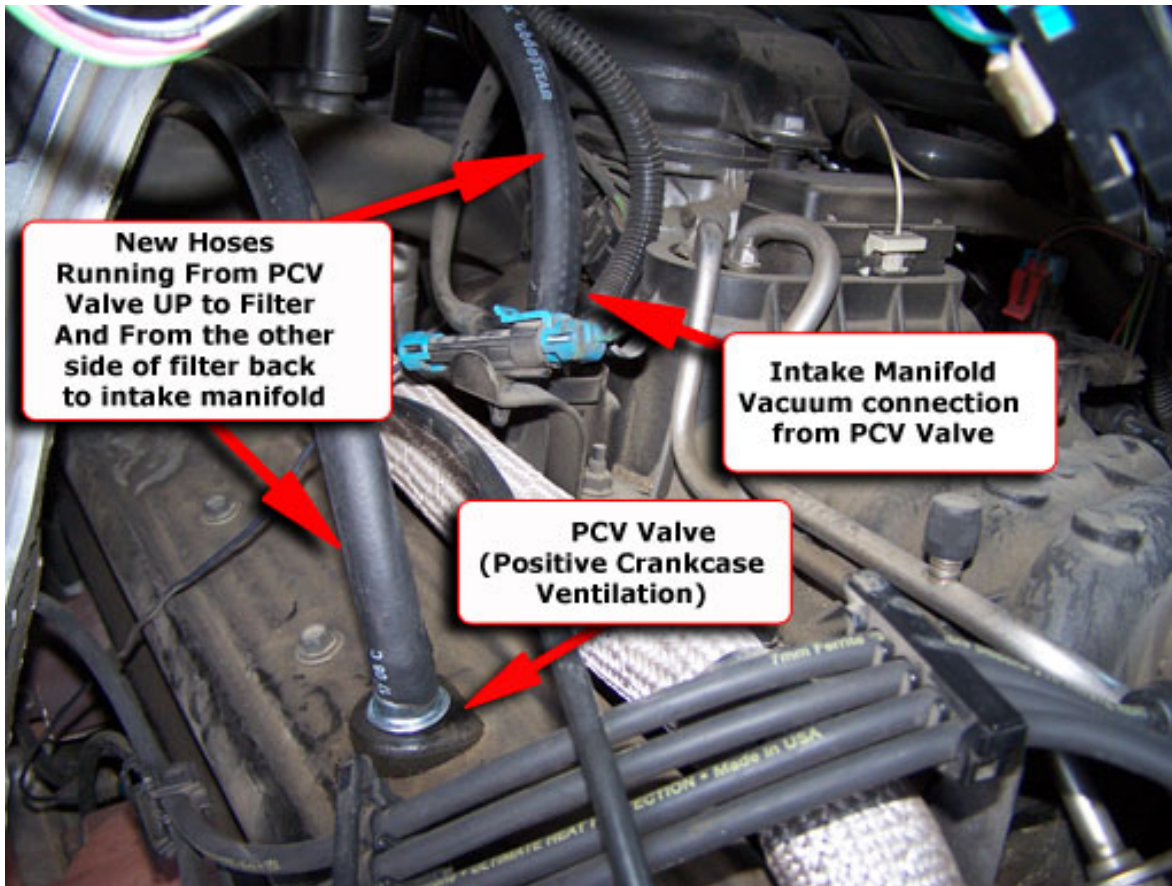
cock.

I used a small stainless clamp and tightened it down to make sure no slippage occurs – it's worked beautifully!

Picture at right is finished product.



Where Does It Install?



New Hoses
Running From PCV
Valve UP to Filter
And From the other
side of filter back
to intake manifold

Intake Manifold
Vacuum connection
from PCV Valve

PCV Valve
(Positive Crankcase
Ventilation)

This is a photo from the 5.7 liter. The PVC valve is in the valve cover on the left. The original connector was just a piece of solid plastic tubing about 10 inches long connecting just behind that blue clip in the picture.

I removed it and bought new **emissions rated hoses (this is important!)** and ran it up to front of vehicle where I have access to drain and remove it.



Here is a close up of what I did. You can see I've used plastic ties to wiring harness and it works fine. It nestles in among the radiator hoses and the heat keeps the water vapor evaporating.

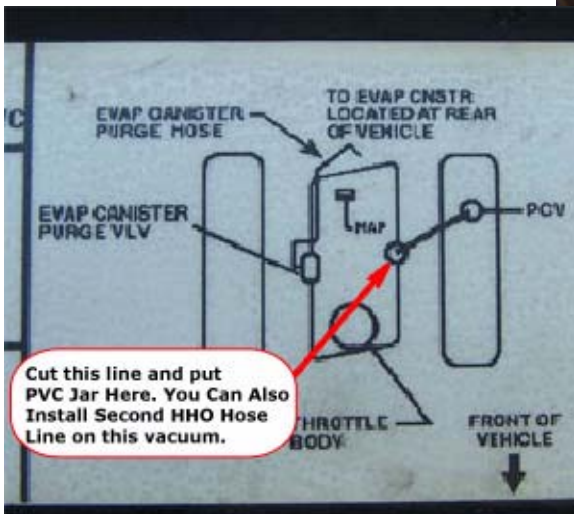
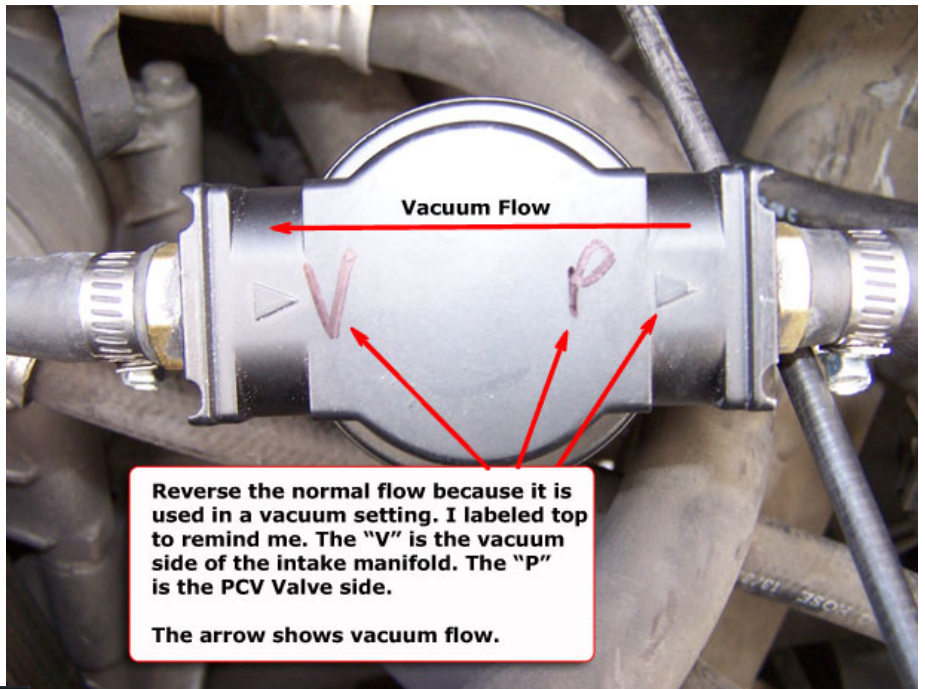
I plan on building a bigger version of this because it has brought me better mileage.

It does seem to have less effect after several weeks, which is why I want to build a revised and updated type like the KeelyNet article mentioned above.

Here is a photo of the top and how to correctly run the hoses.

DOES IT WORK?

When I added this **and** the O2 Sensor Stand offs (to my 2 Upstream O2 sensors) my **mileage went from 21% increase to 34%!** When I removed the ones out of the little zinc filter (not shown here), washed everything out with thinner and let it dry, put it back in, I got a total of **40% increase in mileage!**



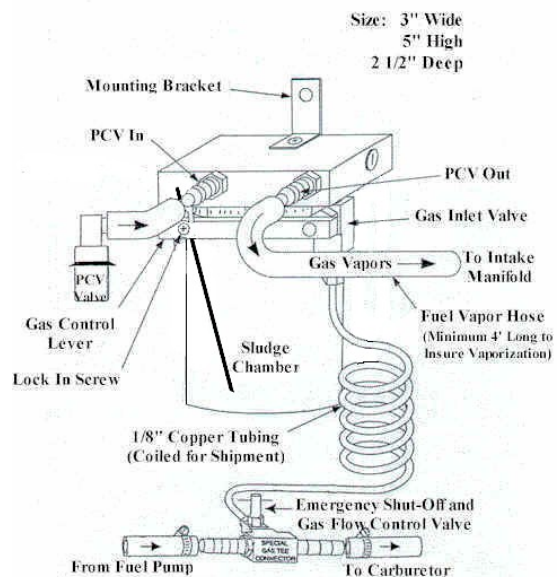
Is it worth it? You tell me. I plan on building my version of an improved KeelyNet PCV Jar in the next couple of weeks – Bigger is better I think! If it works well we may offer it for sale at our online store.

I was intrigued by a company that makes a fuel atomizer based on this old KeelyNet file, it does the same essential thing but introduces a amount of gasoline to vaporize and recirculate.

I am going to test this idea, I think it has merit, especially if one uses copper coated BB's and Silica Gel beads in the container to help Pyrolytically "crack" the vapors.

The article is included below as well as their contact They say they've been harassed and factories have burnt down due to this product, which means there might be merit.

Or they could just be paranoid. Tests will prove one or the other....



FINALLY! The INSTALLATION...

So you've cut, sanded, prepped, glued, and screwed parts together and now you actually want to put it into your car and...

- See If It Works (If you built it the way I show you, It WILL)!
- Crank over your car and see if you notice a difference (You Will)!
- Test It Out and see if you save GAS (You WILL!)

When I first started doing this, the schematics available were not really up to par, and many left out key parts. There also were not clear written directions as to where I put what and with what part, which was a little frustrating to say the least.

Even the vacuum hook-ups were tough to understand, so I took some time to make it as easy to explain as I could. I hope the graphics will help you get a better understanding of a how a REAL, working Water Hybrid Power Cell is put together and installed so everything functions the way it was designed.

There are 3 different aspects to the **INSTALLATION of an HHO Generator**, They are listed in the order you should approach them:

- The Physical Installation of the Hardware including Power Cell, Fuse, Relay and switch.
- The Electrical Hook Up of all components – Power Cell and Hardware
- The Final Connections which are the hoses to FEED the gas into your car's engine.

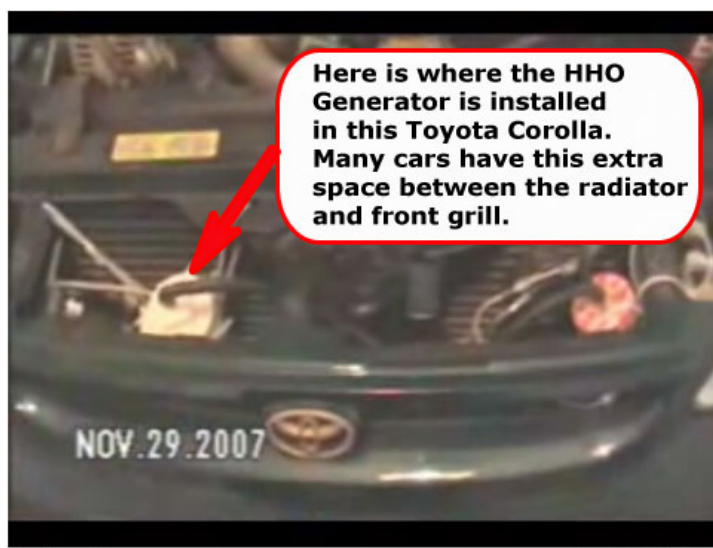
WHERE Do I PUT IT?

It is impossible to be able to direct each of you who have purchased this manual as to the perfect location in your vehicle.

I wish there were a standard place that everyone could use and we could have standard brackets and standard wiring hook-ups, etc...

Unfortunately, the variety of locations is as widely varied as the selection of cars.

Some cars have LOTS of room; others have so much stuff crammed in that you can't even check the oil without great difficulty. Obviously, the older cars have way more room before all the electronics came in.



My first car was an old '68 Ford Falcon with a 200 c.i. straight six. There was SO much room in the engine bay I could practically stand in there. Contrast that with the picture above....

Most new cars have ample room in front of the radiator between it and the front grill like in the picture above. Shorten the container a little if need be to make it fit. If you have to, make the container a lot shorter and put a separate fluid reservoir in place to keep it filled.

Decide WHERE BEFORE You Make Your Container!

In the “LET’S BUILD IT!” section with all the details, I recommended doing this exercise early on. Sometimes you have to open the hood and really examine things for awhile before you make a firm decision.

There are a **few KEY things** you have to remember when looking for a place to install:

- Extreme Heat (Not good)
- Supports and Bracing Issues (Please Don’t just strap it in with Bungee Cords as some suggest).
- Position if at all possible to be able to see the Water Level Sight Tubes
- Can you get to the terminals to check for tightness and electrical connections (sometimes they can loosen up if it gets too hot)
- Lastly, Can You Easily Access to ADD Water (MOST IMPORTANT!)

Extreme Heat

Obviously, you want to keep it AWAY from the exhaust manifold – if it touches, it will melt the container and drip electrolyte all over your engine and driveway or garage. Keep air circulating around it and you’re better off.

I’ve had mine right next to the radiator in hundred degree plus California weather and have never had a problem.

Other than right up against the exhaust, most locations don’t get too hot if you leave even an inch or two of clearance- just be smart and you’ll be fine.

Supports and Bracing Issues

This is a little trickier and takes a little ingenuity from you. If you have trouble, call a friend or relative who is handy with their hands – but if you’ve built the electrolyzer I’m guessing you have the skills...

I found a perfect place for mine in this Chevy Van.

By moving a vacuum ball over a few inches, and making a base out of spare wood, I was able to secure the Power Cell and Bubbler very well. There was a little bump out on the front bracing (which is fiberglass). I used my Dremel and removed the tab leaving a little square hole, but allowing the unit to be strapped tight to the front wall.

I buy 48” Long Plastic ties from Home Depot (in the electrical dept.). They are strong, easy to use, and can be snaked through various areas that stiff brackets or strapping can’t. If I have to remove it, I just snip the ties and use new ones.

Some guys use bungee cords, which looks amateurish and allows too much flexing in the system in my opinion.

Others use large stainless hose clamps which I used at first, but for the price of two, I got a whole package of ties.

It's also sometimes a little tricky to tighten the screw if you don't have much room to work.

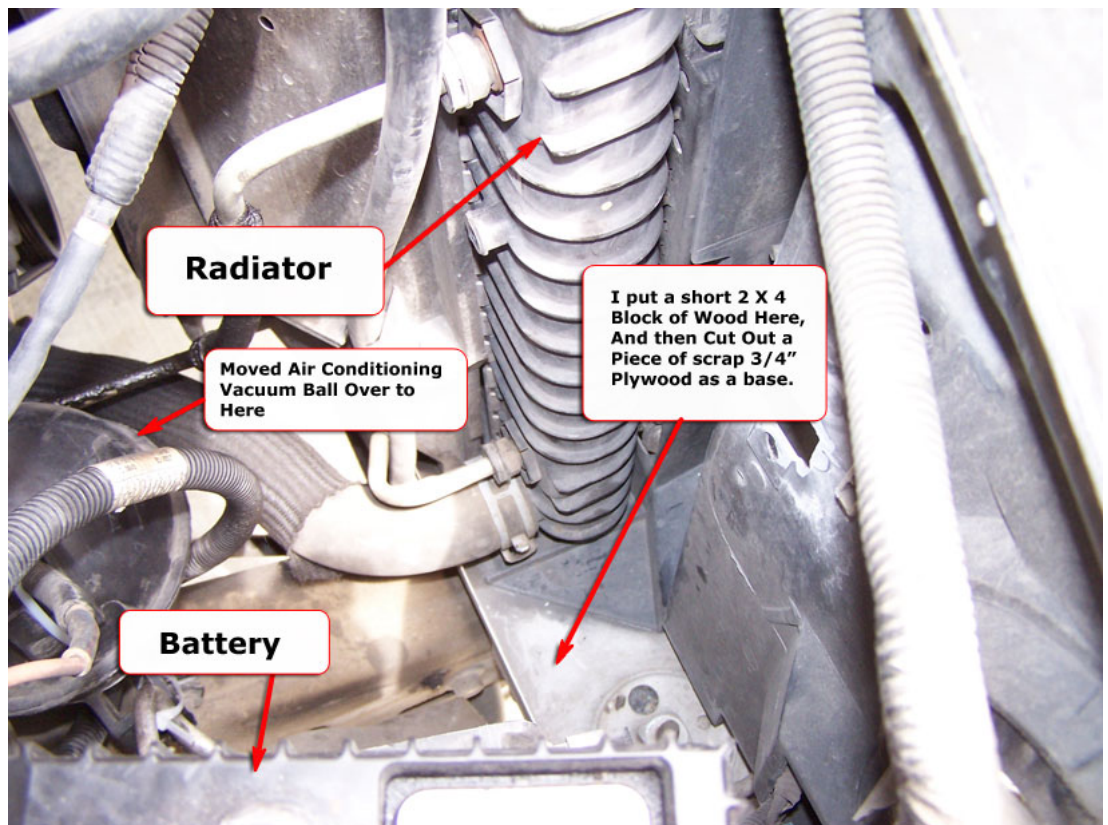
Whatever you choose to do, take the time to make a solid base. If it's far enough away from the engine, you can use wood like I did. You can also use stiff sheet metal, cut it with a saber saw and metal cutting blade.

Screw it or clamp it to the frame or body, just be careful not to drill through anything critical while doing it (like brake lines or wiring, etc. on the underside).

Once you have a solid base, you'll be able to stand your Power Cell on it and devise some kind of strapping to hold it in place. Remember there are a lot of vibrations and bumps that go along with driving a vehicle, and you don't want it shaking loose while you're out on a country road somewhere...

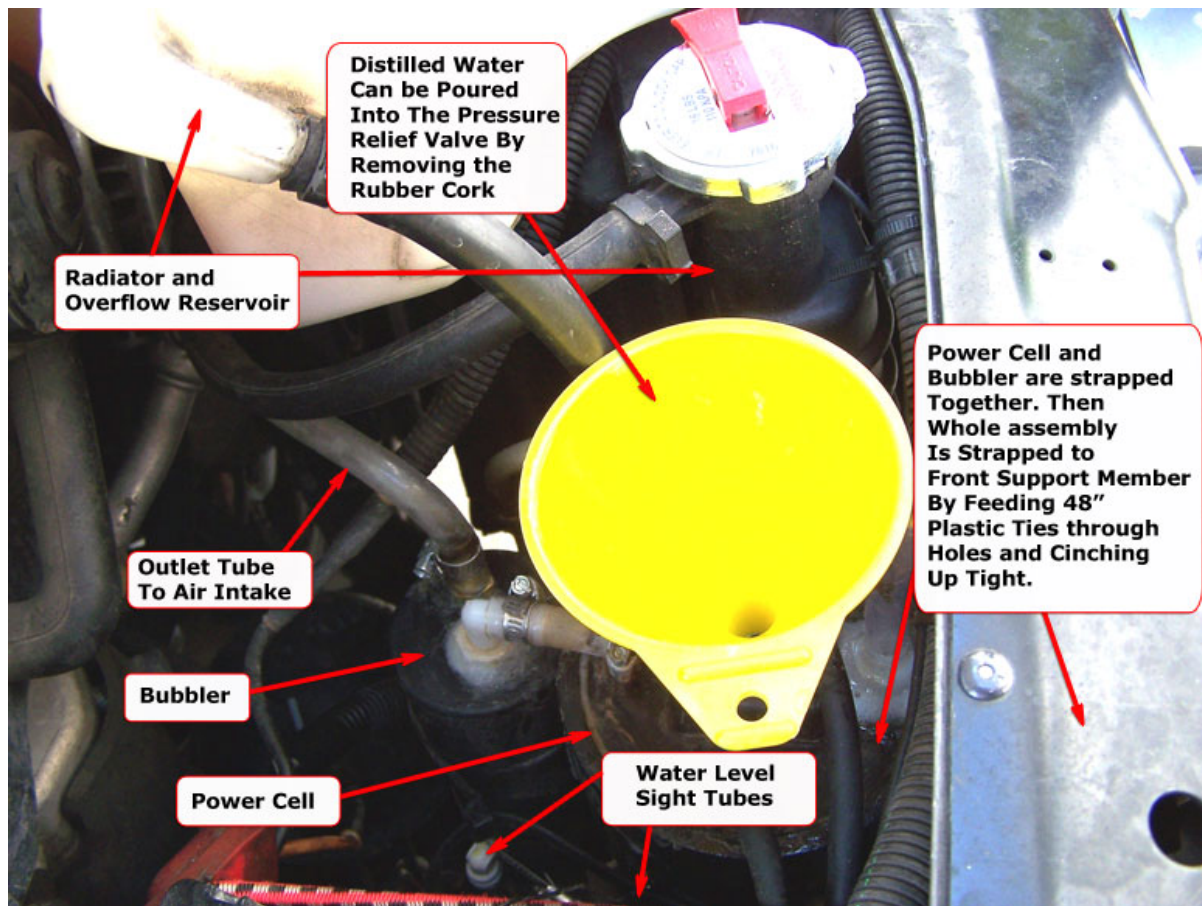
It may seem solid while sitting there idling nice and quietly in your driveway, but think about all the bumps and rattles from everyday driving. Metal brackets or extra large zip ties (48" long by ¼" wide type) are what I prefer.

Make sure all hoses and wires can be routed away from moving parts like fan blades and pulleys for obvious reasons.



Positioning

It takes a little figuring out sometimes, but there's always a way.



You need room for the Power Cell and Bubbler, (I have mine strapped together), room to be able to see the water level in the sight tubes if possible, and room to check the electrical connections from time to time.

You can see how the van install fits in and how easy it is to access everything. It didn't happen by chance! I took some measurements, I even took a piece of the 4" tubing and started sticking it wherever I could to see where the easiest place would be. After that it was easy.

So TIME is well spent here folks. You'll save a lot of headaches by determining where she's going to go first, then make your Power Cell!

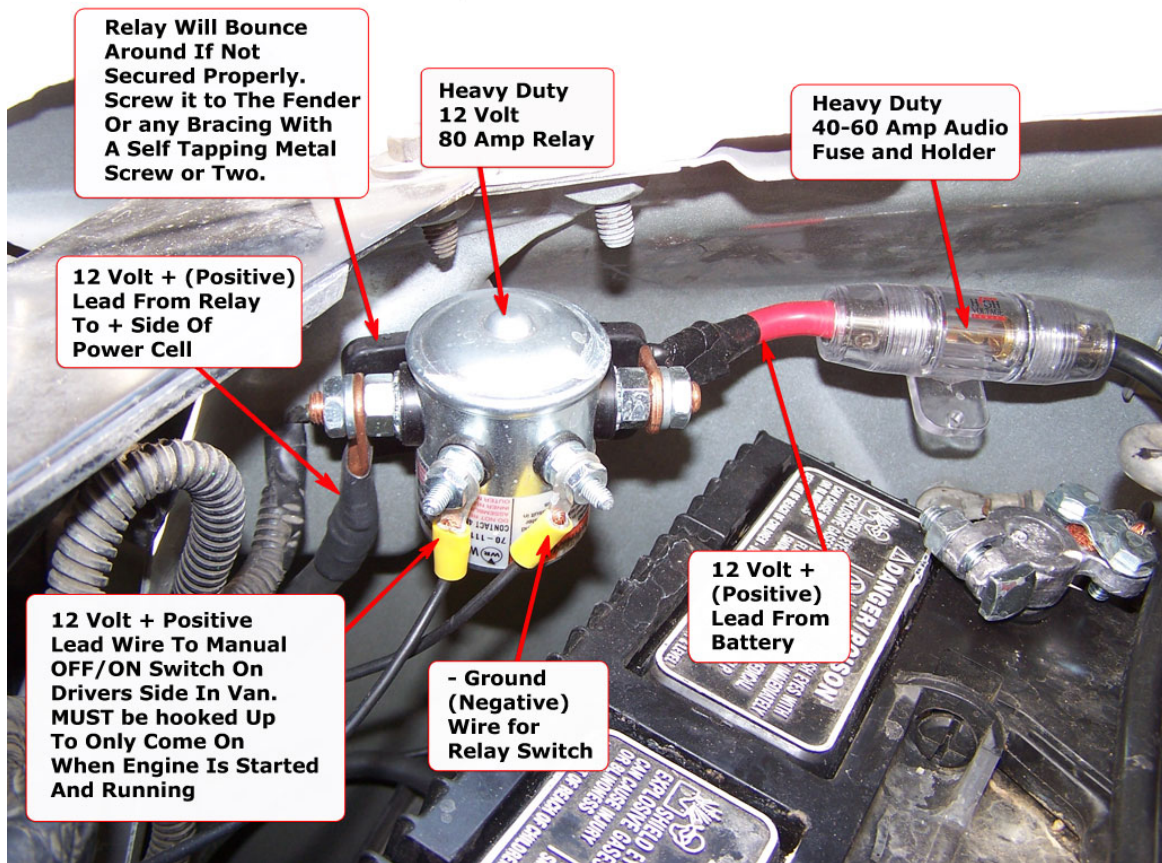
This was also how I determined how TALL to make the container. Loosely fit things together BEFORE gluing and test fit in your vehicle for height and width. Easy to adjust now, not so fun after.

Also, Don't forget to figure an extra inch or so for terminals and valves/fittings on top!

An inch too high can break things and make you cry!

Mounting the Fuse, Relay, and Switch

Another thing really not covered well in other books and videos available are these little essentials of fuses and switches. I do have videos of all this, but let's look closely at what I've done. Maybe it will help you... If you have trouble finding [them we stock a lot of them in our shop - get them here.](#)



Here's a Photo of an install, in the next section we will get into different schematics and perspectives that will clarify for you.

As you can see, I choose to use heavier duty Relays and switches than most. Why? Because they only cost a little more and they are SO much more robust!

For instance, The Audio Fuse above is rated for 40-60 Amps! It's available at any Audio Installation business, just walk in and ask for a 40 Amp Fuse Holder and A couple of fuses. Fuses were about a buck, the holder was about \$7.00.

These work great with heavier cables like I use (I buy mine locally by the foot- it's #4 rubber-coated welders cable). You can also buy 4' battery cables from any auto parts



stores and do the same thing, but I use the other because it's cheaper and easier to use.

You can buy terminals like the one here and use them to hook up to your battery.

I happen to have Top and Side Terminals on mine, so I was able to hook up directly to the top posts – so sweet!



So if you're wondering WHY I upgraded my fuses and relays this picture tells it all. That is a 40 Amp fuse and holder!

Best I could tell, I was running about 37 Amps when it had it's melt down.

These are what a lot of people use, but I don't like them.

Now let's look at a REAL fuse.



These are awesome "Audio" type inline fuses. They are not expensive and I have not blown one yet.

The heavier cables work great because these fuses have set screws in the ends. Just cut the insulation back, insert and tighten down.

The fuse is super easy to see as well, in case it does blow. But if it does, you have more problems than a fuse, at 40+ amps you will burn up you're your alternator as it struggles to keep up with the current draw.



Here's a comparison photo of the rinky dink little 40 Amp fuse and the REAL Deal.

Do you get the feeling I like these fuses?

Do yourself a favor and get these babies...

[We will stock them in our online packages and kits.](#)



Since we are comparing here's another sweet one.

All I ever see is people using the type relays on the left- understandable since they can be found at auto supply stores and Radio Shack.

Now, the one on the left is rated at 40 Amps and cost about \$12.00.

The Monster on the right is from Grainger.com and cost \$25.00. Oh, and it's rated at 80 Amps continuous duty! I would have bought the 40 Amp, but this

one was only about \$2.00 more. Make sure your relays are **rated CONTINUOUS DUTY!** It's one thing to run for 10 minutes, another to keep running for an hour and half, 2 hours or more, like in a trip or commute.

Since I run a Brute Force Electrolyzer, the bigger model is worth it, it never gets hot even running 30 to 35 Amps.

The one on the left, had a melt down at under 40 amps, could not handle continuous current, which means it would probably melt down in extended driving conditions – even at 30 Amps. Now maybe with a PWM (Pulse Width Modulated) Circuit it would survive, but it begs the question, why?

Compare the size of the terminals on each in the above photo. The tiny terminals on the left are supposedly set up to carry 40 amps – the same current that would pass through those heavy duty ¼" terminals of the solenoid relay on the right.

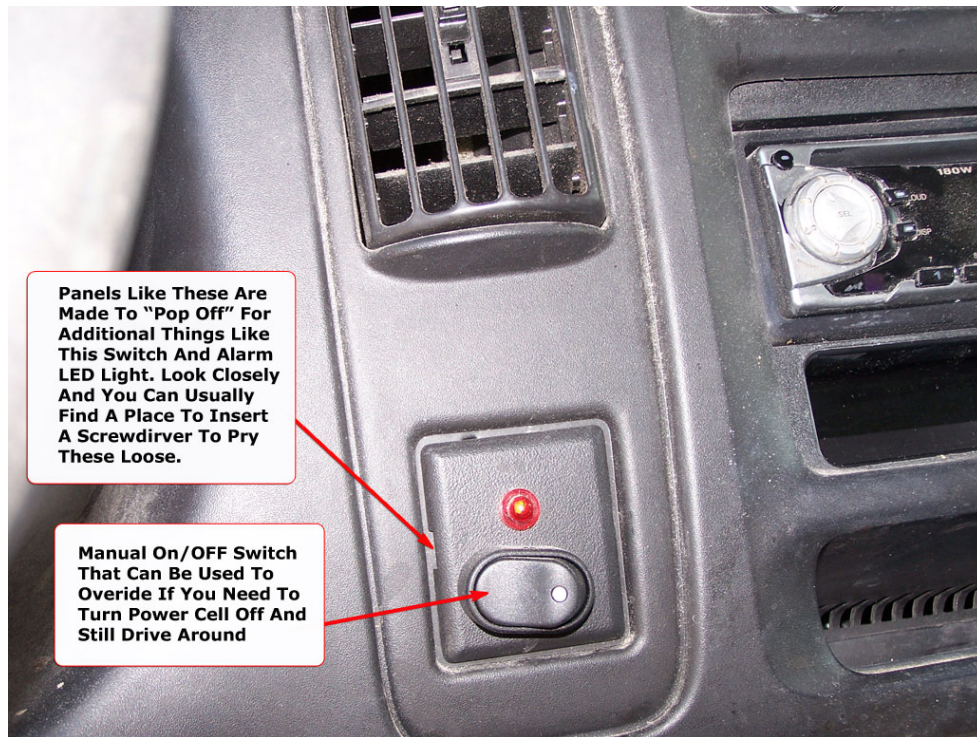
For a few bucks more, isn't it worth the longevity? If you can't find them [we sell similar ones](#) here.

I don't mean to belabor the point here with these two critical items (the fuse and the relay), but no one really takes much time to discuss these clearly, unless you actually purchase an assembled HHO Generator from them. The whole point of my research is to make this a GOOD experience for any willing to try this fun endeavor.

If yours works, others will get excited about it and want to build one, saving money, saving GAS, cleaning up the environment. Everyone wins that way. Feel free to recommend this book while you're at it – sign up as an affiliate and you earn \$60 for everyone you recommend that buys this system!

[Click HERE to learn how you can get this book for FREE, by recommending it to just 2 friends or relatives!](#)

The ON/OFF Switch (Manual Override)



The last quick item to look is the manual override switch. Now, you may wonder if this is necessary. Let me assure you, **it is** (in my opinion).

If something does happen to go wrong, like you go dry in your electrolyzer, or put too much electrolyte in and it gets hot on a hot summer day, then gets a short and blows the PRV (Pressure Relief Valve), then **what do you do if you can't turn it off?** You drive home with it on or break out your tools and unhook everything?

Also, it really is cool to have for testing and measuring your MPG.

For example, I had made some previous improvements that were giving me great results. I decided to turn my Power Cell off for a tank of gas, just to see what the results were.

My mileage instantly dropped back to 10 miles per gallon. So I made another tweak and checked everything before turning the Power Cell back on. I topped off the tank once more and drove the normal routes; the mileage improved to 14 MPG - Best yet!

I also know what it is to run dry out on the road, due to a leak in the Electrolyzer. Once I realized there was a problem, all I had to do was turn off the switch and calmly drive home, where it was an easy fix to get it back in operation.

No sweat.

The wiring diagrams in our next section include how to wire this ON/OFF switch, they only cost \$10 for a light with an LED (any Auto Parts Store) and don't take much time to put in.

INSTALLATION – THE WIRING!

Many do it yourselfers are great builders and constructors with the hardware stuff, from woods to plastics to metals and everything in between, but electricity scares many.

I personally love the stuff. I've wired full homes and businesses (in my younger days), and have my share of "getting bitten" as it's called.

I prefer ultra high voltages like my million volt Tesla Coil that puts out 5' lightning sparks! Oh yeah baby – now we're talkin'!

This picture on the right shows a million volt coil (It's not mine- but looks just like it). My photos turned out horrible, and don't capture the beauty inherent in that controlled violence of electricity.

Thankfully, we're not working with 1,000,000 volts! Not even the standard 120 Volts; we're just working with good ole' reliable 12 volt car systems. Now, don't get me wrong! 12 volts with 85 Amp current can definitely do some damage, so you still have to respect it.



But follow these easy to understand wiring illustrations I have made and you will amaze your friends!

For those of you with electrical background, especially the electronics field, please forgive my deviation from normal diagrams and schematics. I read them and understand them myself, but I know many who draw a blank when it comes to translating a working electrical schematic into physical hook ups.

The VISUAL MAP

I designed these to be used as visual Maps, with a path connecting everything. There's a start and finish and everything must connect in between to get to the end. That really is how electricity works- it flows out one side of the battery, through the path all the way back into the other side.

You stop it by putting a "Gate" in the path, which is a switch or fuse. Open the gate and on it goes happily scooting along the road you've made. An electrical short would be like someone carving a dangerous path up to the road and putting a fake sign that says "This way to Grandma's house". Electricity gets mad when it's let off the good path, you don't want electricity getting "short" with you.

So much for little primer on electricity – doesn't sound so ominous anymore- does it?

I have created a full page illustration for you to make it as simple and clear as possible. This is for a standard "Brute Force" Power Cell like I'm teaching you to build.

Most people are not going to want an aftermarket Ammeter installed in their car, so I didn't include it in the illustration, but I will make another one with that and a PWM (Pulse Width Modulator) circuit included at a later time, if I get enough requests.

This circuit illustrated on the following page, represents the common, basic circuit that is used in most installations.

I have illustrated it as a "Path" for you to follow. **I recommend you first do all the hardware installations** as outlined above, first. Get everything located and anchored into place, that way you can cut and install wires as short as possible and be able to route them away from moving or hot parts of the engine.

You WILL Be Showing This Off!

Believe me, You WILL be showing this off to family and friends! You Will totally amaze them with your new found knowledge and expertise on this subject! I show several people a day.

So do us all a favor, and take the time to make a nice installation. You don't want to open your hood to a jumble of tangled wires that look like they're going to some homemade bomb.

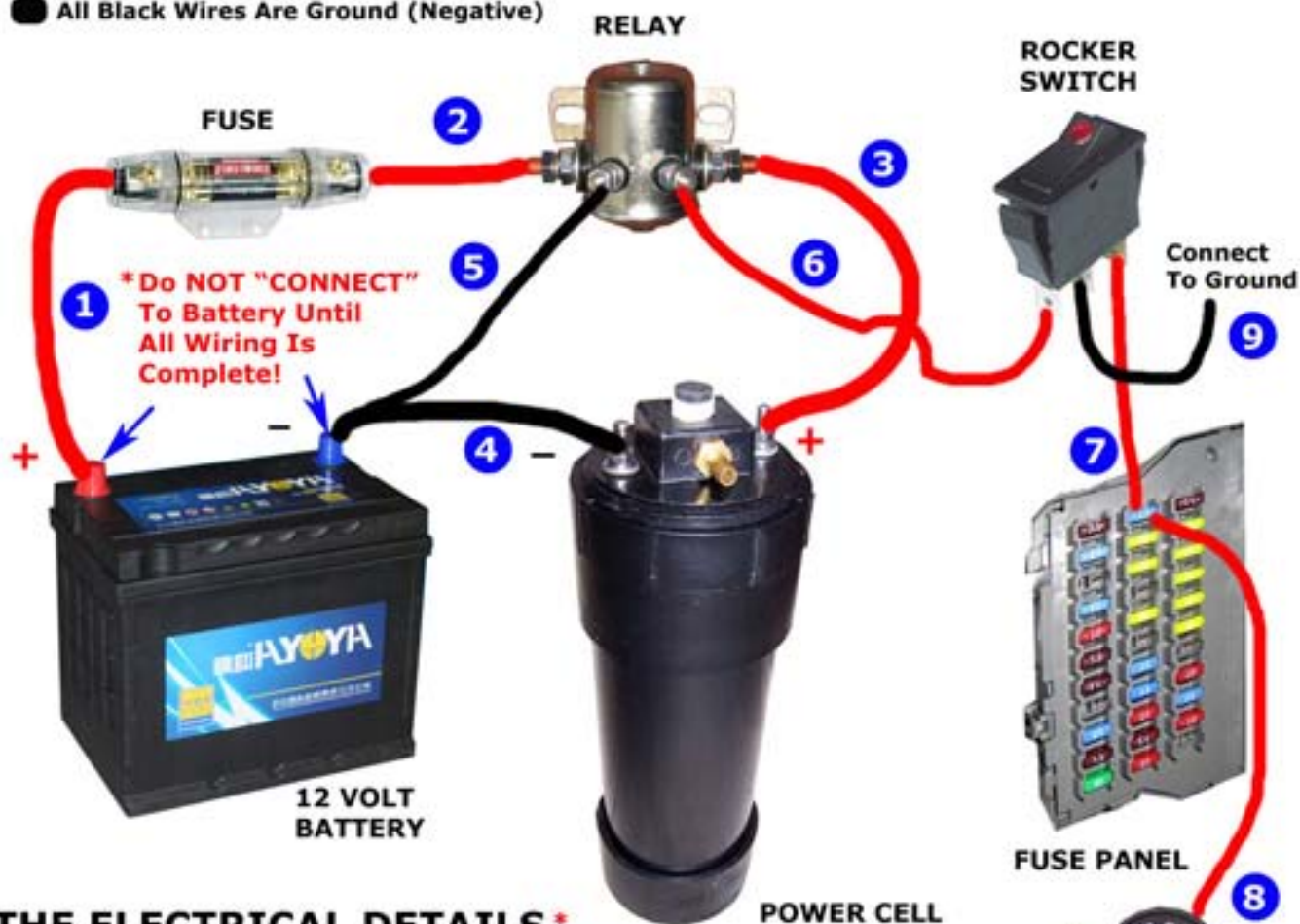
So do a respectable job so others will be interested enough to build one! **There will also be plenty of people willing to PAY YOU to build one AND install it in their car**, IF you do a professional looking job. So take some time to do it right and it could very quickly bring you extra cash!

All right, let's look at our electrical layout on the next page...

[Click HERE to learn how you can get this book for FREE, by recommending it to just 2 friends or relatives!](#)

● All Red Wires Are Hot (12 Volt Positive)

● All Black Wires Are Ground (Negative)



THE ELECTRICAL DETAILS *

1. Go From Battery + To Fuse. (*Do NOT CONNECT Directly to Battery!)
2. Out Of Fuse To One Terminal of Relay
3. From Relay To + Side of Power Cell
4. Go From Battery - To Power Cell -
5. Go From Battery - To Ground Side of Relay Switch
6. Go From 12 Volt Side Of Relay Switch To One Side Of Rocker Switch
7. Go From Other Side Of Rocker Switch To Driver's Side Fuse Panel
8. Connect to ONE SIDE Of Any Fuse (15 Amp or up) That is ONLY on When Ignition Switch is ON (Not ACC or Start Positions)
9. If Rocker Switch Has 3 Terminals (light), Connect 3rd to Ground.

Water Hybrid Power Cell - Electrical

As you can see, I've illustrated it step by step for you so there will be no confusion on your part. It may help you to print this page out to keep with you as you put things together.

So, follow the steps as outlined, starting with Step One.

CAUTION! Though the drawing shows you starting at the battery, this is for illustration purposes only – to teach you to see the “Path”. DO NOT under any circumstances; actually hook up to the battery as you wire things in.

ALWAYS, ALWAYS, ALWAYS, (did I mention always?) run your circuits and connect everything up FIRST! **THEN as a last step, connect your battery! Be Smart. We don't like stupid.**

As you begin, simply lay the wire next to the battery, or better yet, pull the battery out (noting which side is + and which is -) to make it easier to run wiring and things.

You basically have two basic paths here:

- The “Heavy Current” workhorse path and
- The “Switching” path (like our “Gate”)

The Heavy Current Path

The Heavy Current Path (which is what does our work inside the Power Cell) starts at the Positive leg of the battery (Step 1) goes through the fuse to the relay (Step 2), Out the relay and to one side of the Power Cell (Step 3) , goes down through the leads and across the stainless steel plate stack inside swimming across water and creating HHO gas while doing it (hmmm is this HHO gas just electrical farts?).

It comes out the other side of the plate stack and up through the – negative lead of the Power Cell and back to the Battery through the negative lead (Step 4).

So that is the Heavy Current Side of things. It's where the 15-20 Amps (or more) flow through. It's no different than hooking up jumper cables between the battery and Power Cell (DON'T do that) except you introduce a fuse and a switch (Relay).

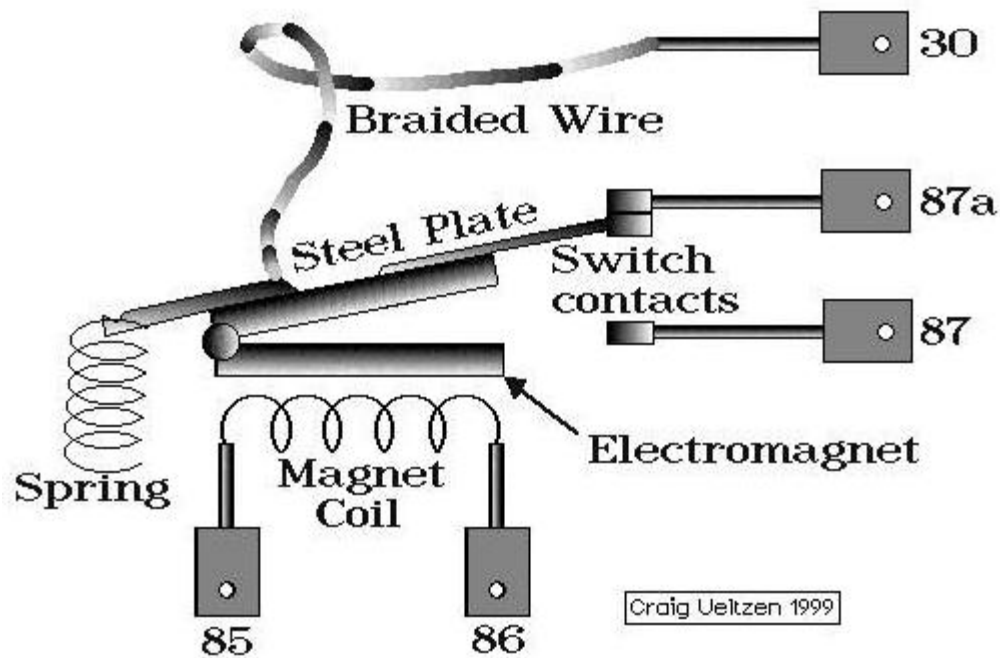
The Switching Path

You want a way to turn all that current on and off. If you just ran a battery cable into the drivers area and put a switch in it and then ran it directly to the Power Cell, you'd run into problems. Why? Because switching Heavy currents like the type coming from our battery is not easy.

When you disconnect from a high current line the current wants to keep going and it will continue as an arc or spark as the switch is turned off. This quickly burns the contacts in a normal switch, making it useless very quickly.

So the trick is to design a heavy duty switch that can take that heavy current and then have something else turn that switch on and off safely.

That's what a relay does.



Our relay doesn't have the middle contact like the one illustrated above (87a). The 30 and 87 would be like the 2 heavy duty contacts on our relay that the heavy current flows through. 85 and 86 are like the smaller terminals- one hooked up to ground, and the other only "energizes" the coil when the ignition is turned on.

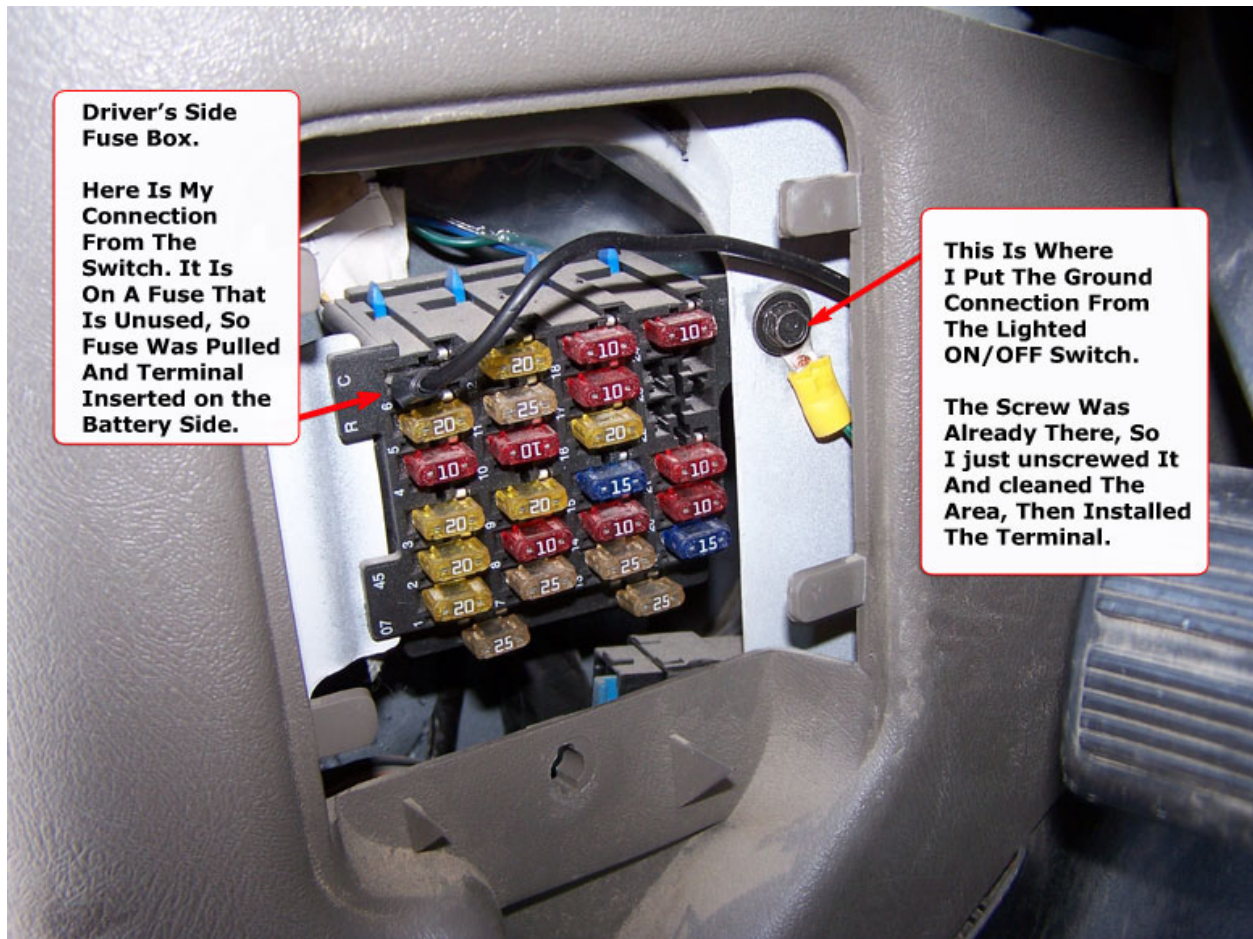
The coil operates an electromagnet that pulls the heavy switch down into place, allowing current to flow. Turning off the ignition causes a heavy duty spring to pull the switch open quickly, shutting off the flow of current.

Getting back to our Wiring Diagram above; we already have the heavy leads hooked up. So the 2 smaller terminals in front are our small current switch.

Step 5 is just hooked to ground. It can be to a spare lead on the – side of the battery or even to a metal or frame ground on your car, doesn't matter.

Step 6 is very important – let's look a little closer at that one.

Hooking Up Your Ignition Switch into the Circuit



**Driver's Side
Fuse Box.**

**Here Is My
Connection
From The
Switch. It Is
On A Fuse That
Is Unused, So
Fuse Was Pulled
And Terminal
Inserted on the
Battery Side.**

**This Is Where
I Put The Ground
Connection From
The Lighted
ON/OFF Switch.**

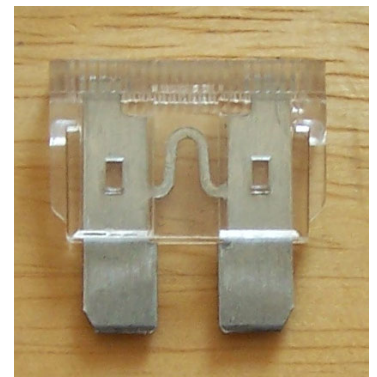
**The Screw Was
Already There, So
I just unscrewed It
And cleaned The
Area, Then Installed
The Terminal.**

This is a photo from my drivers' side fuse panel. The black wire is plugged into ONE side of the battery terminal. You can get a small spade terminal and crimp it on your wire or if you don't have one, just break open a car fuse like the one below and solder a wire to it, then wrap the exposed end with electrical tape.

Sometimes the spade terminals tend to be thin so they don't stay snug in the fuse clips, or they can be too wide to fit in, in which case a dremel tool with a little cut-off disk can take care of that.

If you break a fuse, just cut off the connector and insert the bare wire into the hole, twist it around itself and solder to secure. It's cheap, you can even use a blown fuse, and they're guaranteed to fit!

NOTE: Since our initial book was published, we have since discovered a neat little product called Add-A-Circuit that makes it really easy to tap into your fuse box to add the switch for your relay. You can get them locally or we stock them [in our store](#). We now include them in all our complete installation kits....



How Do I Find The Right Fuse?



Good question. You'll want a meter for this one. An inexpensive one can be found at Radio Shack or your local home improvement center. Just get something like this one, you should have one anyway if you're going to be messing with an HHO Generator...

You could use just a wire connected to a flashlight bulb, but a meter is easier.

So pull the panel cover off and first look for any fuse holders that have terminals in them (some are empty from the factory). Sometimes these are set-up as optional equipment fuses, and if the car doesn't have it (like cruise control or heated rear window defogger, etc.), the terminals are there, but no fuse is inserted.

These are a great place to start because they generally are set-up to only come on when ignition is turned on already.

You can often look at the panel cover and there will be a fuse legend showing where everything goes and what it's for. Look for something with 10-15 amps, though it doesn't really matter because we are going to draw from the battery side of the fuse, not the other side

In this close up, you can see the terminal inserted on the left side of the fuse terminal. Because there is no fuse in it, the other side is dead – make sense?

If there were a fuse, current would flow from this side, through fuse and then to the load, whatever it was.

Once you have located a potential terminal, turn your keys to run position (don't actually start your car), and hold your black meter lead to a good ground like a screw into metal nearby or anything that's grounded.



Then carefully touch the red end to one side of each terminal and then the other. If the fuse is out like mine above, 12 volts will only show on one side of the terminal.

Test a couple out while you have the keys on. Now you know for sure what is hot.

Turn the keys off. Touch your red lead to each terminal that was hot when car was on. If you still see 12 volts, don't use that one! Always on means your HHO Generator will be working 24 hours a day, or at least until the battery dies down.

DANGER! This IS where you need to have some understanding of what you're working with. Ultimately HHO can SAVE YOU Money and clean up the environment in the process, BUT it is an explosive gas!

YOU MUST CONNECT TO A CIRCUIT THAT IS OFF WHEN THE CAR IS OFF.

If this thing works all night long making Hydrogen and forcing it into your engine- ummm. You get the picture... I know a guy who foolishly disabled his ON/OFF switch and left his generator running for several hours without the car being on. He came back out to find his battery dead (should have been his first clue). He hooked up some jumper cables and kablooeey! The hydrogen had seeped into every nook and cranny of his engine- the first spark ignited everything and literally split his engine head all the way down the middle. Remember what I said about not being stupid? There's a reason for that....

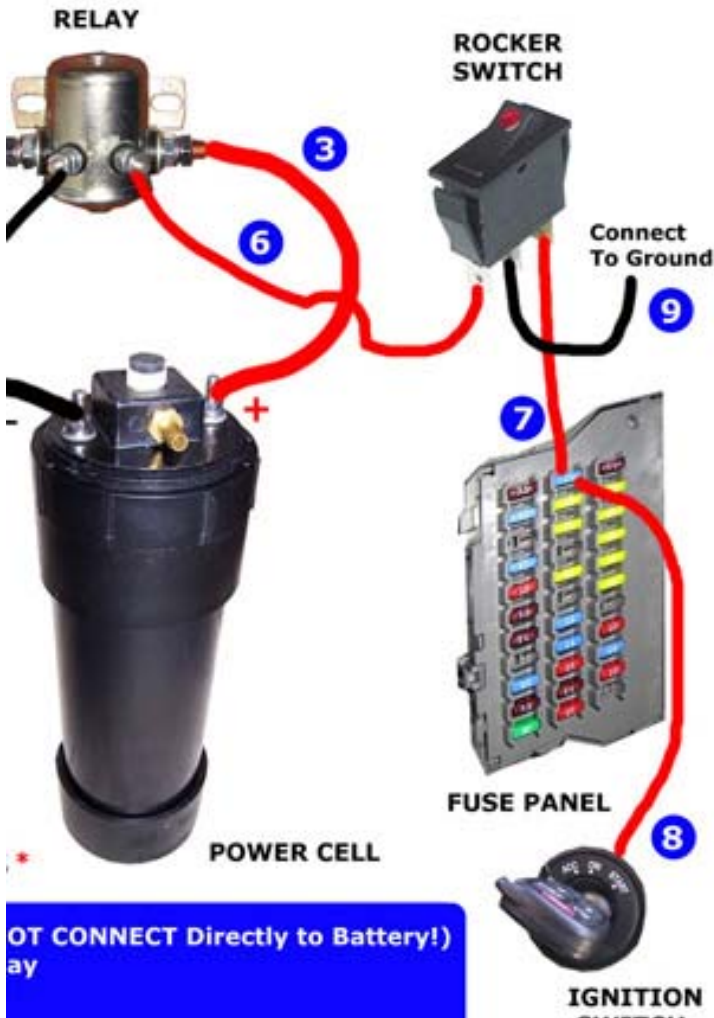


This would probably not inspire your neighbors to have you build one for them...

Remember our adage: Be SMART, Don't be stupid. We Don't like Stupid and Stupid should not be building Hydrogen generators!

Ok Then. Got that out of my system (would be kind of a neat experiment in a "Mythbusters" kind of way, hmmmm, somewhere in an undisclosed desert area.... Back to reality....

Once you have located the correct fuse terminal, the rest is easy.



Just run a wire (14 or 16 Gauge Stranded) from the Relay switch side to your rocker switch (Step 6).

Come out the other side to the fuse terminal you just located that is ONLY ON When car IS RUNNING! (Step 7)

Step 8 just emphasizes that the fuse is only powered up WHEN CAR IS RUNNING.

Did I mention the thing about the car running?

Step 9 is used if the rocker switch you bought has 3 terminals, which means it has a light that indicates when it's powered up – I like those because it's easy to tell and you don't have to remember which way is on.

The instructions on the switch will tell you which is to the load (the Relay), which is 12 volt (From the fuse) and which is ground.

You're almost done...

Once everything is hooked up, double check your connections, then hook up the battery for a quick test. Don't worry, if you don't have water and electrolyte in your power cell, it won't start making gas yet....

START IT UP!

1. Use your meter to check the voltage at the HHO terminals. They should read zero.
2. Check battery voltage to make sure it's charged – should be about 12.5 – 12.75 volts.
3. Also check the terminals of the Relay- put black lead of meter on neg side of battery, then touch red lead to relay terminals (heavy current side) You should read 12 volts on one side but not the other.
4. Check small leads on relay. They should also read zero volts.
5. Start car (with Manual ON/OFF switch turned ON), you should here a "clicking" sound when you first start it up. That's normal with a heavy duty relay (it's the magnet closing the switch)
6. Now check leads of the HHO Power Cell – they should read 12 Volts

7. Check both sides of relay as before. They should read 12 volts on both sides of the heavy current terminals (checking with black meter lead connected to ground remember)
8. Check both sides of relay switch (black and red leads touching these) You should get 12 volts between them
9. Check your battery with car running. You should have at least 13.5 volts.

Also, while the car is running, turn the manual ON/OFF switch to OFF. Now double check to make sure all voltages are zero at the Power Cell and Relay. I notice with mine, there seems to be about 1.5 volts registering on the relay switch when off, not sure why, but it's not enough to create any HHO so as long as it's not showing 12 volts it's OK.

Does Everything Check out? Now's the time to fix it if not, but if you followed the directions, you should be good to go.

Alright! Turn your car off and let's get to the **last phase of Installation** – getting that HHO into your engine!

INSTALLATION – Hooking Up the HOSES!

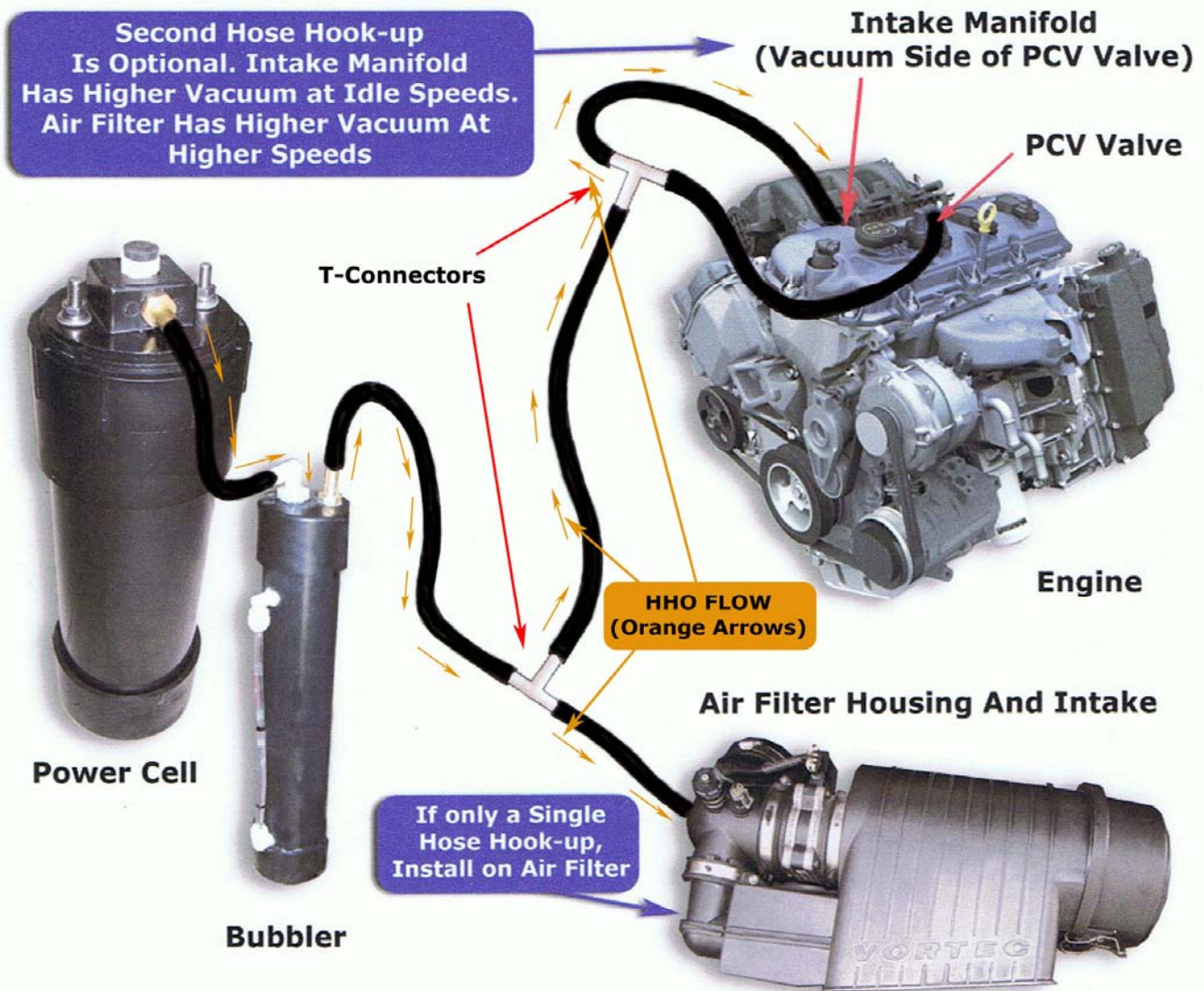
OK! I've created a graphic that you can use to better understand the routes available to you.

Again, rather than making it in an engineers layout (schematic), I've drawn it as a path to follow, just like the electrical hook-up, but without the numbered steps.

You can print this page out for your self, keep it with you as you hook things up, it will make it easier.

Let's take a look then, shall we?

We may decide to include emissions rated hoses in our kits as well.



Water Hybrid Power Cell - Vacuum and Hose Hook-up To Engine

This is pretty straight-forward, and easier to understand and explain than the electrical. There are a couple of things to note...

I've used 3/8" vinyl tubing in the past, but they can loosen up when hot, allowing outside air to be drawn in and dropping HHO injection. Or the HHO can actually leak out.

So if you use this, make sure you install it with hose clamps and tighten everything down, you certainly DON'T want any HHO gas escaping under your hood (even though it holds the record for the fastest dissipating gas – let's not test it out, ok?)

You must be ULTRA- careful that it doesn't touch any hot or moving parts! Use plastic ties to strap it down after the route is picked and hoses are cut and installed. Just because it's laying there when your car is idling in the driveway, doesn't mean it won't be flopping in the wind at highway speed!

I would not recommend the clear vinyl tubing for anything but break-in and testing for the first time. It does allow you to see that awesome gas coming up and out of the Power Cell and getting sucked into the air intake!

After that initial testing and you make sure all is working properly, I would switch them out with the Black Rubber 3/8" ID Fuel/Emission Hose from the local auto parts store, like the one picture below. Or use the thick reinforced tubing available at Home Depot. It's clear with webbing molded in for strength and is 3/8" ID and 5/8" OD so it won't collapse under vacuum and heat. Either works well, but we like clear because you see the gas being sucked into the engine. Just don't use thin wall vinyl- it will go flat under vacuum from the engine.



Either one mentioned above is designed to handle the heat, and thick walled so it won't collapse like the clear vinyl will under vacuum, and you can use it for the PVC jar Enhancement if you choose to because it's designed for emission use.

It also makes for a nice install all the way around.

In the illustration above, I show everything separated and obviously not to scale for ease of use.

In reality, I like to mount the HHO generator and the Bubbler together, if you have the room. If not, try to keep the hoses short, so you don't have a lot of gas gathering in it in case of a backfire from your car (the main reason for a bubbler!)

Also, try to arrange the location on the side or nearest to the air intake of your car if possible, the shortest route is always the best. Don't snake through 6' of hose before reaching the intake. Best to keep it 2' – 3' in length, but up to 4' can work if necessary.

Just remember it's simple physics here, the longer the hose the more friction inside slowing the Gas and creating turbulence. Shortest point between 2 lines is always best.

Will That Be ONE HOSE or TWO?

I personally have run hose with no trouble, but if you have any spots in your performance where it seems to idle just a smidge rough, an extra hose to the engine vacuum will help.

In this close-up, the actual line from PVC valve to the intake manifold side is much shorter, shown here only for easier comprehension.

Usually it's quite short and may be difficult to put a nylon "T" fitting in. This is where you can just remove the old one and put a little longer new one using hose like above.

DO NOT use vinyl here- it will collapse under vacuum!

[For fittings and connectors](#)
[Check our store](#)

Vacuum Higher At IDLE

The opinions vary on one or two hoses. The main reason you can consider it is that when your car is idling at lower RPM, the vacuum at the intake manifold is much greater than at the air filter.

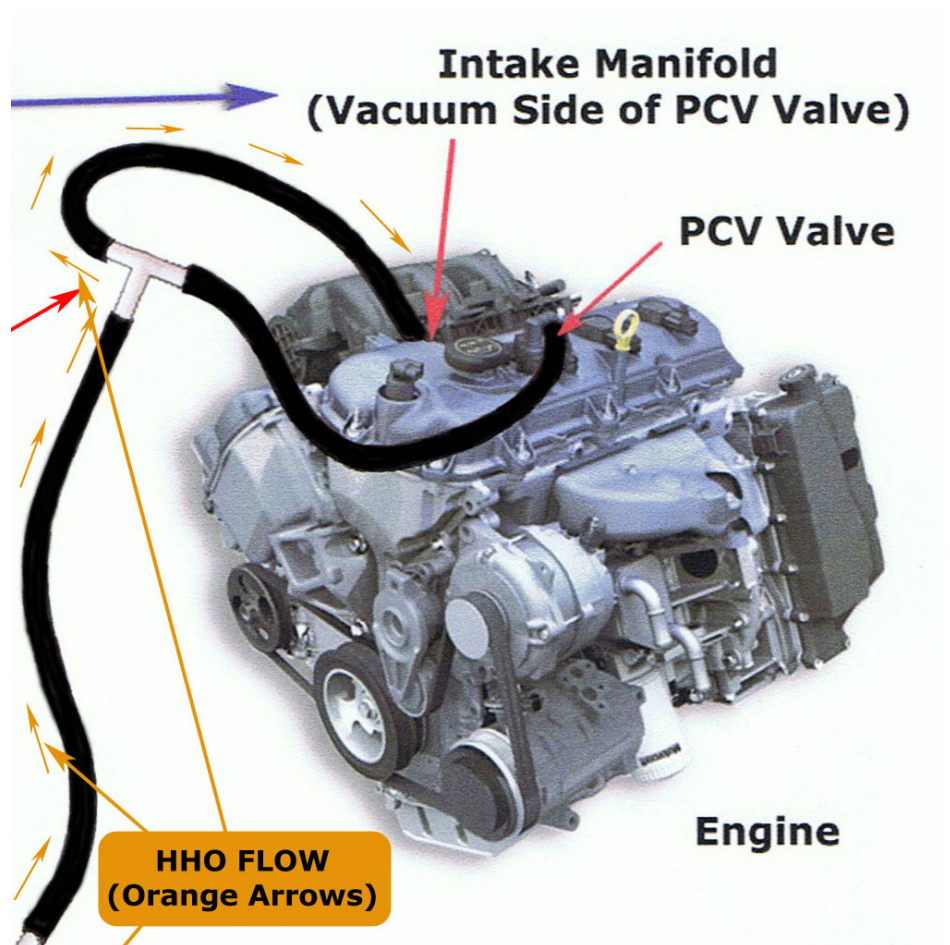
As speed increases, the vacuum actually becomes LESS in the manifold due to a variety of things, and the massive flow of air into the Air Filter at higher speeds quickly becomes predominant.

So choice is really yours.

ONE OTHER Reason for 2 Hoses

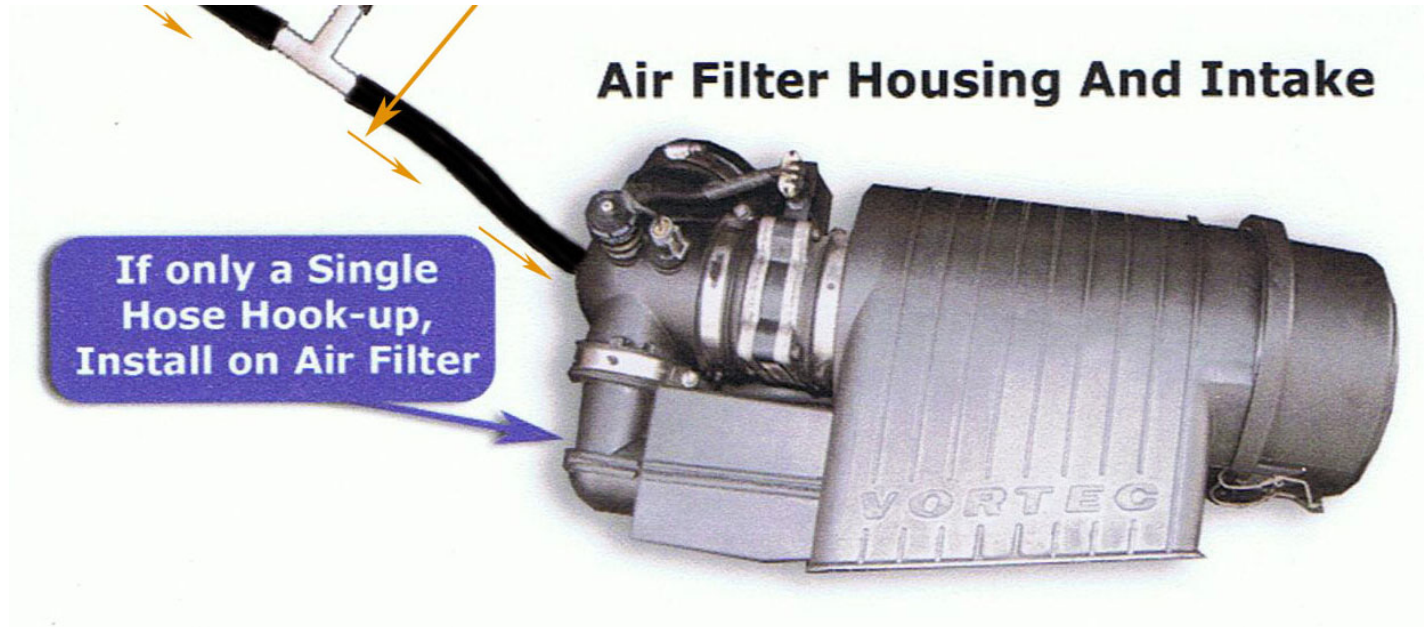
If you plan on using the PVC Jar Enhancement, This second feed line could be very advantageous, and here's why...

As mentioned in that section, the Copper coated BB's and Silica Gel were recommended by a former chemist that worked at an oil refinery. He says that they use these to help chemically "Crack" the oil into refined gases.



SO if you inserted a PVC Jar into that line between the Intake Manifold and the HHO gas input line, the HHO gas would be sucked into the PVC Jar as well as the recirculating exhaust gases, and it is possible that the metals inside would help to separate the hydrogen even further from the HHO gas as it entered the engine.

I plan to try this theory soon – once I build a larger model of the PVC jar.



The AIR FILTER Hook-Up

Let's talk about this a little further as well. Do you know that if you stick the hose in the wrong way, that you could actually eliminate all ability of the HHO gas to enter the engine?

Simply drilling a quick hole and stuffing a vinyl tube in is absolutely the WRONG way to do this!

Why? Again, simple air fluid mechanics. And you NEED to understand that if you want the most efficiency out of your machine! You have a tremendous volume of air traveling through your air filter, you can either use this to your advantage or ignore it – the choice is yours.

So let's look at the best method I have found to get that gas into your intake!

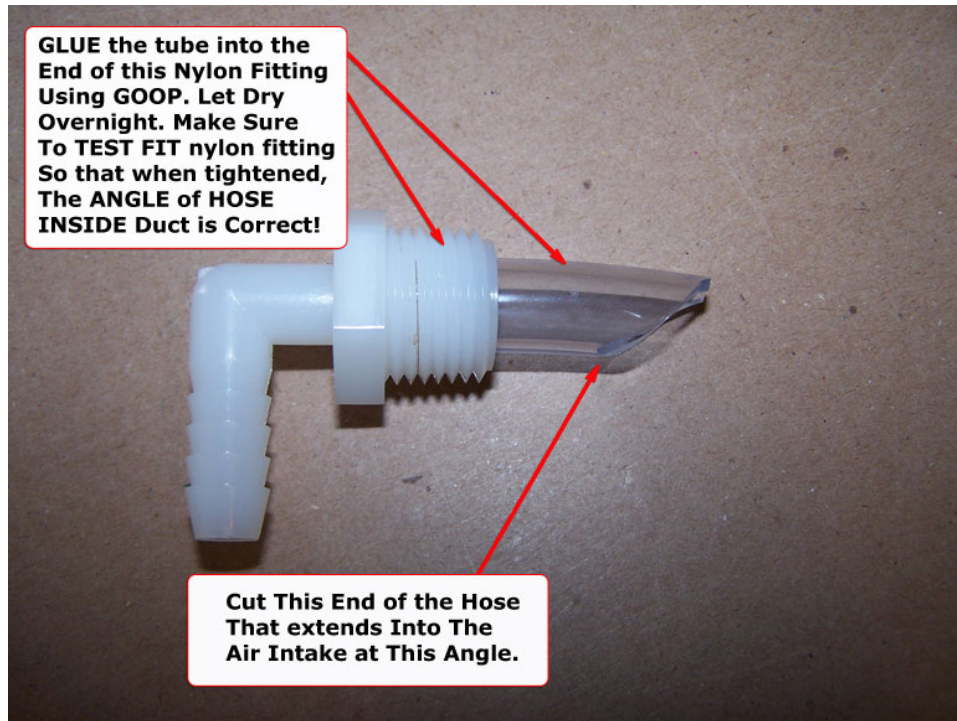
The VENTURI Effect

If you are familiar with carburetors, you know what the Venturi Effect is...

Venturi Effect -- The speedup of air through a constriction due to the pressure rise on the upwind side of the constriction and the pressure drop on the downwind side as the air diverges to leave the constriction.

Huh? If you're not familiar with it, that's OK. You don't need to understand it to know it's effect. Briefly, if you cause a rapid air flow around a tube, the air will speed up as it goes around it creating a vacuum in the tube itself.

This is how ALL carburetors function. They have little fuel jets (tubes) inside that the air stream flows around and "Draws" out the fuel to mix it with the air before it goes into your engine.

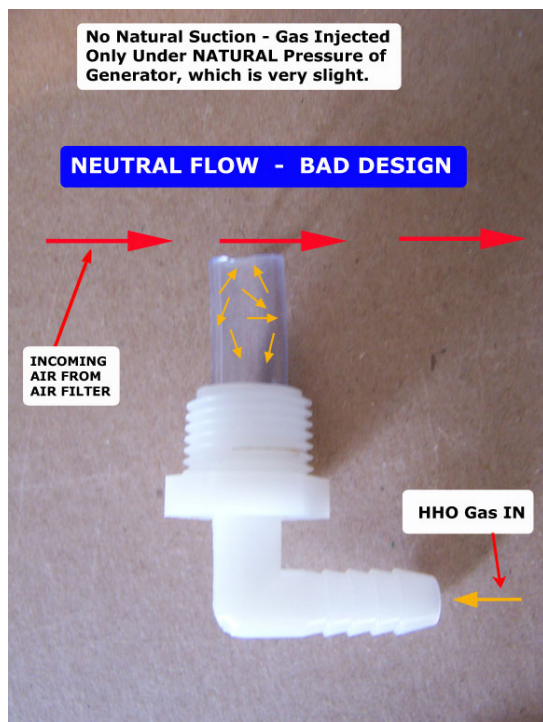


This is how I Prep my fittings that go into the Air filter or surrounding housings.

The clear vinyl tubing fits snugly inside the base of the nylon fitting. This happens to be a 3/4" Nylon fitting with a 3/8" Barb. The clear vinyl tube is 3/8" ID and 1/2" OD which makes a nice fit inside the fitting.

It's pretty snug already, but make sure to glue it with some GOOP, because you DON'T want that little hose being sucked into your engine – know what I mean?

Let's look more closely at some illustrations I made to help you understand what I feel is a critical design function not talked about...



To CUT or NOT to CUT, That is the Question....

In this first illustration, I show you what is happening inside your filter housing.

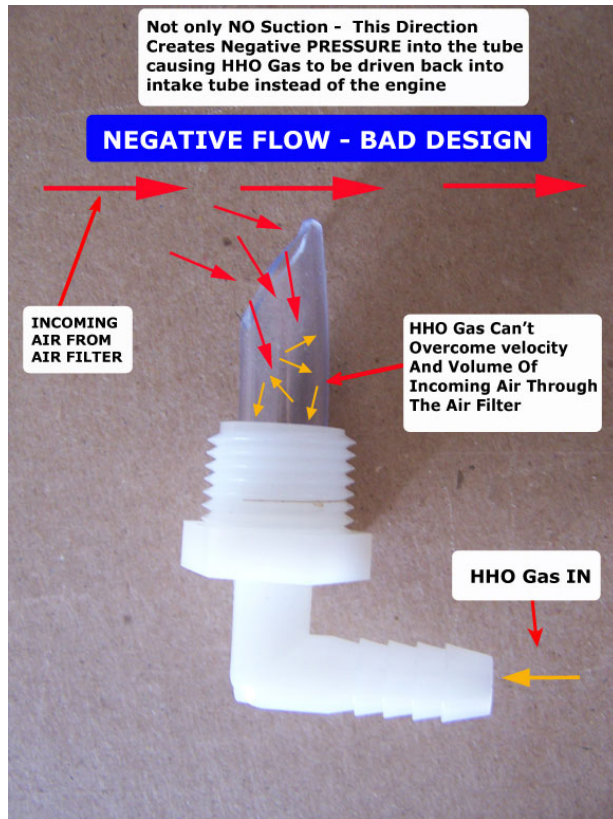
With a flat cut hose, (which I suspect is what 99% of experimenters use) or just a fitting screwed into the housing (they both have same effect), largely wastes the force of air coming in over the top.

At the very least, the fitting should be tilted in the direction of the flow (rotated to the right) so that air can be sucked out of the tube instead of over the top.

I call this a neutral flow situation. If you have a decent HHO Power Cell, it can work, but not nearly as efficient as it could be.

HHO generators do not put out a lot of pressure (by design), so the massive amount of air being sucked in to your cars engine can easily overpower the ability of the HHO gas until it builds more pressure.

Most people who use fittings (which I definitely recommend) will tap them straight in, not thinking about this important feature.



So let's look at how **NOT** to install the cut fitting next...

If you install the angled cut facing the Wrong Way, it will cause an even worse action to happen than if you had just a flat tube.

By facing the incoming air, you create a "scoop" that actually funnels the air down the tube – it will pressurize the inlet tube and not allow the HHO gas to migrate up into the air flow, at least , not much of it.

This would give you the impression that HHO gas doesn't work, which wouldn't be true.

OK, now we now how NOT to do it, let's look at the BEST way to install...

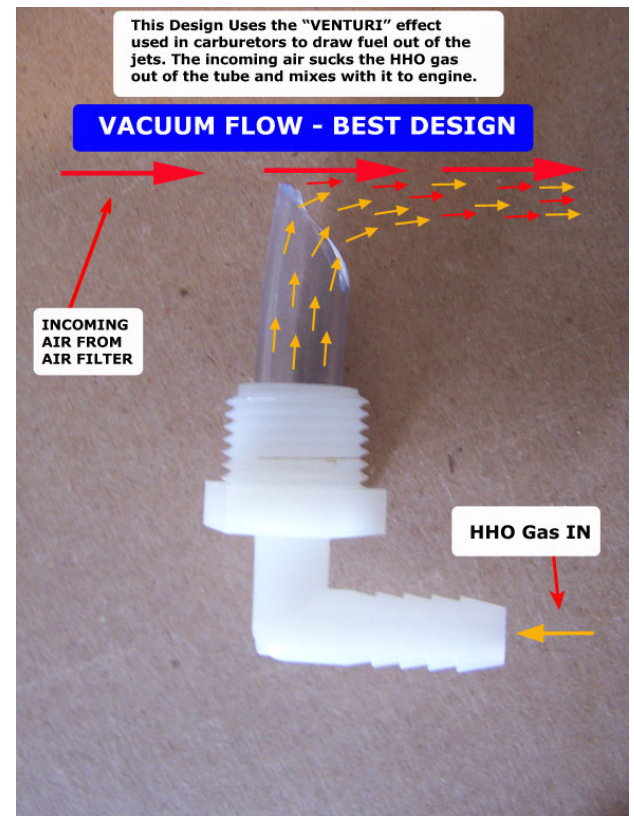
By facing the angled cut AWAY from the airflow, you create in Essence a Vacuum effect that literally draws the HHO gas out as fast as you can make it.

SO when you install the fitting,
Make double and triple sure that you pay attention to this detail!

The best way to accomplish this that I have found, is to install the fitting in a test fit first – Drill/Tap the hole and screw it in as if you were done.

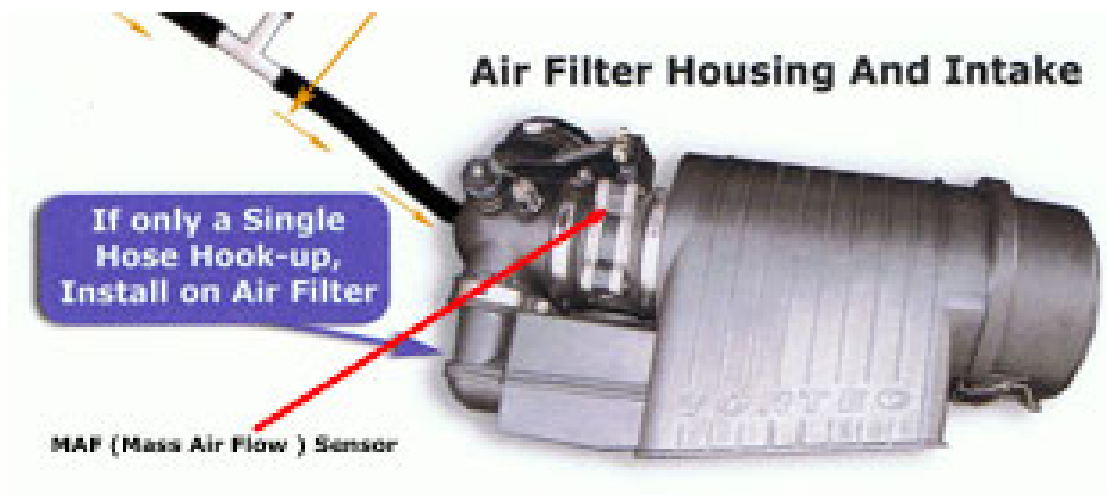
Then insert the little venturi tube in from the inside (obviously you've removed it from the car to do this) and position it to face the right way.

Remove the fitting, pull the tube out (noting the way it faces), put some GOOP on it and insert it back in making sure the GOOP doesn't block the opening of the fitting.



I suggest reinstalling the nylon fitting into the filter assembly before it sets up just to insure the fitting is facing where it needs to be. Put some GOOP on the threads before you screw it in, and it will be sealed up when it dries.

WHERE'S The Best Place To Put The Fitting?



On this example, the air filter housing is on the right (a cylindrical air filter) then there is the MAF (Mass Air Flow) sensor, and then the plastic duct that connects to the flex hose right before the throttle valve on the intake.

I know there are some who have had problems putting the inlet hose on the engine side of the MAF sensor (these have always seemed to be related to idle stumbling which again seems to be an argument for the secondary hose hook-up), but mine is installed under those sensors to the left of the MAF and I've never had any problems with the single hose hook up.

However, in the spirit of research I will most likely run a second hose as mentioned above to test and report on...

My thought is to get the inlet hose as close to the throttle plate as possible thereby keeping it away from affecting the MAF sensor.

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Let's FIRE This Baby UP!

Well congratulations! If you've made it to this point, you are about to be rewarded for your effort!

Before we get this thing cooking, do one last final check to make sure all is well- double check all wiring and hoses to insure there is nothing loose or flopping around, and nothing is even close to a moving part or exhaust.

If you have not yet done it, make sure you mix up a fresh batch of electrolyte with about 2 teaspoons of KOH and distilled water. I generally fill the Power Cell first (before I put the cap on for the final time), then pre-mix a little water and KOH – then pour that pre-dissolved solution in to the container and stir.

Insert Plate stack and check on external water level sight tubes. You want as much electrolyte and water covering the plate stack as possible and still have a couple inches of space ABOVE the water line for HHO Gas production.



One example of an HHO Generator. Here it is just before turning it on, doing a test in the car.



Here it is as it begins generating HHO. Notice the amount of foam and bubbles generated.



And here it is with the car running. Notice the effect that car vacuum has on the production. This is why you leave space at the top for HHO.

Here's an example of engine vacuum and its effect on HHO generators. I always add a vacuum check valve on mine because it does allow some external air in to prevent foam from being sucked into the engine.

This is not the design I show you in the manual, but another experimenters' test rig. I only use it to demonstrate a principal for you. If this were mine, I'd have a bubbler...

Turn It ON!

So now you have everything ready to fire up, and everything's double-checked, and you've got a filled Power Cell and Bubbler (remember, bubbler can just be Tap water, filled half way up only!)

So what are you waiting for? Turn it on!

Immediately upon turning it on, you should see some gas beginning to be drawn up the tube and into the filter (if you have a clear vinyl test tube installed). Some cars immediately respond to new gas by lowering the idle automatically, others take a little time to register.

The first time I fired mine up, I was discussing it with my future son-in-law, and we were going over some things as it was idling in my driveway. After about ten to fifteen minutes, the idle suddenly dropped as the computer realized it didn't need as much fuel – very cool!

Your experience may be different than mine – it all depends on make and model of car and the programming of that particular manufacturer.

Measure Performance

I have included videos of my initial tests and measurements, but here are some photos and instructions.

When you first start it up, it's a good idea to get a base reading of current being drawn by your HHO Power Cell.

You need a Good Meter to do this. Most do not measure above 10 Amps, so if you try to measure above this (yours is designed to operate in the 16 -20+ amps range!), you WILL blow your meter or the fuse inside.

I invested in a nice meter from Grainger. It was only \$49 and allows me to measure up to 20 amps. It also allows the measurement of Temperature and comes with a wire/probe setup – you just touch the end to whatever you want to measure and it gives reading in real time.

This is an EXTECH model 410, comes with meter, probes, and temp sensor.



Even at 20 amps, I blew my first fuse because I was drawing about 30 amps on mine (I have made some revisions which I can't talk about quite yet that allow me to run as high as 40 amps without overheating or melting anything).

If you do blow one, Radio Shack sells replacements. You will have to unscrew the cover to get to it.

The BEST and safest way to measure comes from a guy called zerofossilfuel on YouTube, who also came up with the easy to make HHOmeter to measure flow of generators.

When you have some time, check out his series of over a hundred videos, probably one of the best experimenters online and he obviously has a “teaching” ability.

Here is my version of what he calls the “Poor Man’s Shunt”. In high current applications, normal meters cannot handle huge flow of electricity or they would blow. The only way to prevent this and still provide a method of measurement is to separate out the meter from the main flow, using a “Shunt”.

This shunt is essentially just a wire or device built with a predetermined resistance. For instance, for every AMP that would flow through it at say 100 volts, it would measure one millivolt or one milliamp.

The meter would then only read a thousandth of the true current going in, which it could safely do.

Unfortunately a good shunt can cost as much as a good meter. But here’s a cheap and quick one you can make from spare parts.

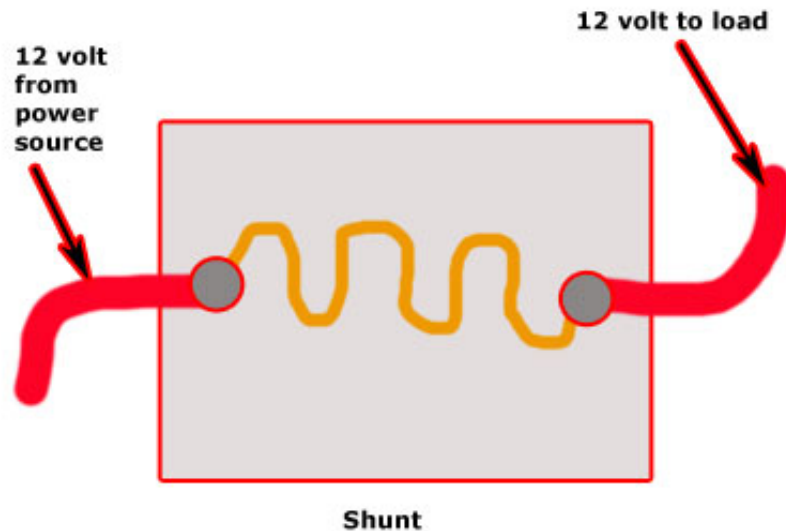


Yeah, I know, not to pretty. It’s downright ugly! I told you it could be made with spare parts – my cost was \$0...

It’s basically a piece of wood with 2 bolts (1/4”) held tight with nuts. Make them long enough to allow 2 sets of nuts and the wire/terminals. 1-1/2 are good.

The wire was just some solid core 14 gauge copper house wiring that I stripped bare. That one above has about 10 inches to it, and it was bent like that to shorten it so it would fit on a small board. No mystery there.

So to “calibrate” this high tech piece of equipment, you need to measure a known voltage/current through it. I used a small power supply that puts out 12 volts/3 amps – perfect!



Measure Current by connecting 12 Volt + lead to one side and another power lead to load on the other side. Do NOT try to measure current by using red meter lead on one side and black on the other of this shunt, you will only be able to measure voltage that way.

Connect the power supply 12 volt lead to one side, then a separate lead to the load (in this case I just used a charged battery). The black lead of power supply was hooked up to negative side of battery.

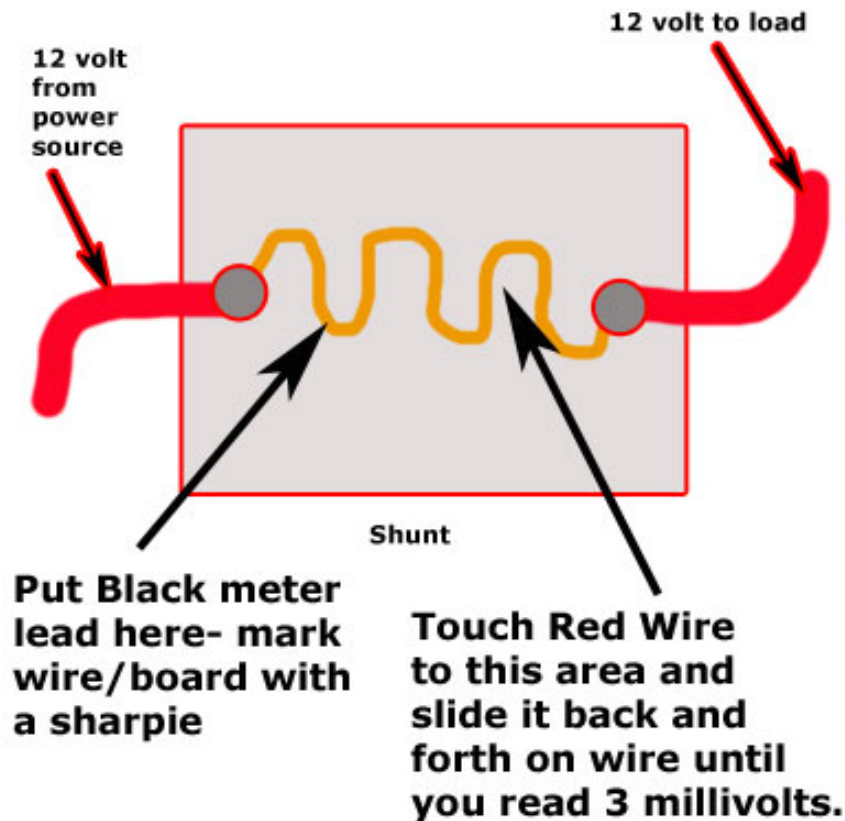
So now we KNOW that 3 amps are flowing through, and you can check with your meter to verify. Now, change settings on meter to millivolts.

Look at the illustration below to understand next step. After setting meter to millivolts, mark a starting line on copper wire and note it on the board. Set your black meter lead here.

Now take your red meter lead, and place it on the copper wire somewhere in the vicinity indicated. Begin sliding it backward or forward until your meter reads "3 millivolts". Mark that location on wire and board.

Congratulations! You've just calibrated this high tech piece of equipment!

So now you know that for every amp you draw through this shunt, it equals one millivolt.



Take it to your car and disconnect the positive HHO lead from either the Power Cell or the relay side. Connect that lead to one side of this shunt and use a spare wire (with a clip/terminal on both ends) to go from shunt to load (Power Cell).

Start your car and turn on HHO generator. Now immediately measure current. You should be getting 16 – 18 amps when cold which will show as 16-18 millivolts on your meter. If too low add just a pinch of electrolyte (pre dissolve in a plastic cup and a small amount of water-pour in through pressure relief valve at top). If too high, you may need to remove some water (use a battery suction bulb) and add more distilled to dilute.

It can run a little cold and be perfectly fine, though HHO gas production is a little less, but if you run it too hot, **you RISK overheating the terminals on the lid and they can melt the plastic**, which will cause problems!

If it starts out cold at 16 amps, it will run warm at about 20, which is perfect for this design. Any hotter and you create problems – ask me how I know this?

Now let your car idle and get to operating temperature or even take it for a spin! **Make sure to turn off the car and remove the shunt first!** You should notice a difference in response both in acceleration from slow and when you kick it down on the highway!

I noticed an immediate improvement. My idle was also much smoother and quieter – I had to check to make sure it hadn't stalled it was so quiet!

Now that you're warmed up, turn off the vehicle, open the hood and re-install the Shunt. Now start the car again and measure your current. Is it within that 20 amp range? It should be within an amp or two, if not adjust it.

I have invented some cool breakthroughs that fix this problem and can personally run mine at 35 – 40 amps, though I choose about 30 because of load on the alternator.

Mine can put out about 2.5 – 3.0 liters per minute – check out the videos included with this manual! If it turns out my improvements are not patentable, I will freely share them with the all who purchased this course.

If they are patentable (as suggested by a friend of mine who was a VP with Clorox), then I need to finish patent applications and get those processing first.

YOU DID IT!

Hallelujah- Success! You should be excited at this point because you've constructed and installed your very own Hydrogen Gas Generator using parts readily available to everyone. You will find a ton of people, friends, neighbors, and relatives that either want you to build them one, or build and install one, or want to know how you found out about it.

You could create a side business just building and installing these units in your area, as gas continues to skyrocket out of control, people are screaming for ANY solutions – you have one now.

In Fact, You Probably have the **ONLY** quick solution to a major problem. I had one friend who saw my first install, and he immediately called his friend who owns a large Meat Packing/Delivery business. His profit margins are so tight that he told me that if I could just save him 5% on gas, he would pay **me to BUILD and INSTALL them in ALL seven of his vehicles AND his Escalade!**

Think of the possibilities that could open for you!

Whatever you decide, whether to build and install for others, just build them, or just make money referring our system, we wish you all the success you can handle!

Help Us Spread The Word!

We want this technology to spread across the land and around the world. People everywhere are powerless to deal with this vital necessity (even in Europe they're spending almost \$10 a gallon!

This is right now, the **ONLY** technology giving measurable, gas-saving results and it is an **IMMEDIATE** way for people to begin saving money.

We have made it easy for you to be able to recommend this HHO Manual and system to anyone you know **AND** if they buy it too, you can earn as much as \$60 from each book!

**Get a few friends to buy it and you've paid for the manual
AND your Water Hybrid Power Cell essentially getting
them for free! How cool is that!?**

[If you want to find out how, Click Here!](#)

Thank you for purchasing this system, and taking the time to read through and hopefully build and install your own.

We'd love to hear from you on your thoughts and results. Even if you just liked the manual and felt it answered the right questions for you, your feedback is important.

Please email us support@hybridwaterpower.com and give us your testimonial and feedback!

And don't forget to scroll down and check out our other books and articles included with this manual!

[IF YOU WANT TO BUY PARTS,KITS, and or PRE-ASSEMBLED UNITS CHECK HERE.](#)

What about the warranty?

Conditions that may void a vehicle's warranty are specified in a law called the **Moss-Magnusson Act** which stipulates dealers cannot void warranties because vehicles have aftermarket parts. If the dealer can prove a particular aftermarket part caused a particular failure, they can disallow the claim for that issue **only**. For example, if your engine fails, the dealer can't refuse to fix it because the car has aftermarket wheels. However, if the engine has been modified, they may have a case and may deny the claim. We don't modify engines in any way to run HHO Gas.

All Sensor or Fuel System modifications can void a manufacturer's warranty, if the modification caused a failure, regardless of what aftermarket manufacturers may claim. **If the dealer finds it in the car**, and the warranty claim is engine related, the dealer may have a case and may attempt to not honor the claim under warranty. **The dealer still has to prove the modification caused the failure.**

Good luck Mr. Dealer, it will cost you thousands more to prove it than it would cost to honor the warranty!

To date, there have been no failures caused by using hydrogen as an alternative fuel.

The Other Books and Manuals

All Books, Manuals, Shopping List, and Calculator are available at the [private member download page](#) where you downloaded this manual and are described below:

The FREE O2 Circuit Board DESIGNS AND SCHEMATICS

Two designs and schematics for making your own EFIE (Electronic Fuel Injection Enhancer) to deal with the O2 sensor. A MUST read if you want to build your own.

Make Your Own Distilled Water For FREE!

A collection of Solar distillers you can make to distill your own pond water, creek water, hose and tap water, rain water or whatever. Includes the quick TEN MINUTE SOLAR DISTILLER you can make with a 5 gallon bucket!

How To Build Your Own HHOMeter to measure Gas Output

Important if you want to build and install multiple units – great cheap way to measure the efficiency of your designs and builds!

CAN You Run A CAR JUST on WATER?

One man did and others are trying to follow...

The Complete Run Down on the JOE CELL

This 100+ page book explains every detail if you want to travel this route. Fact or Fiction? You decide...

High Mileage Inventions - Suppressed or Supposed?

You always thought it – especially with our current out of control gas prices. Now learn the facts in this collection of articles and patents I put together for you.

A list of great discussion groups you can join

Any serious Hydrogen/Alternative energy researcher needs to keep abreast of current breakthroughs in technology. Join these FREE forums and keep current!

YouTube videos you Really Need to Watch!

I've compiled a short list of what I consider important You Tube videos I think are worth your time

Our Own Private Videos

This is a collection of over 11 DVD's worth of video that were shot during the making and installation of some of our Power Cells. Members only.

Download this Excel Calculator To Chart Your Mileage Gains!

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